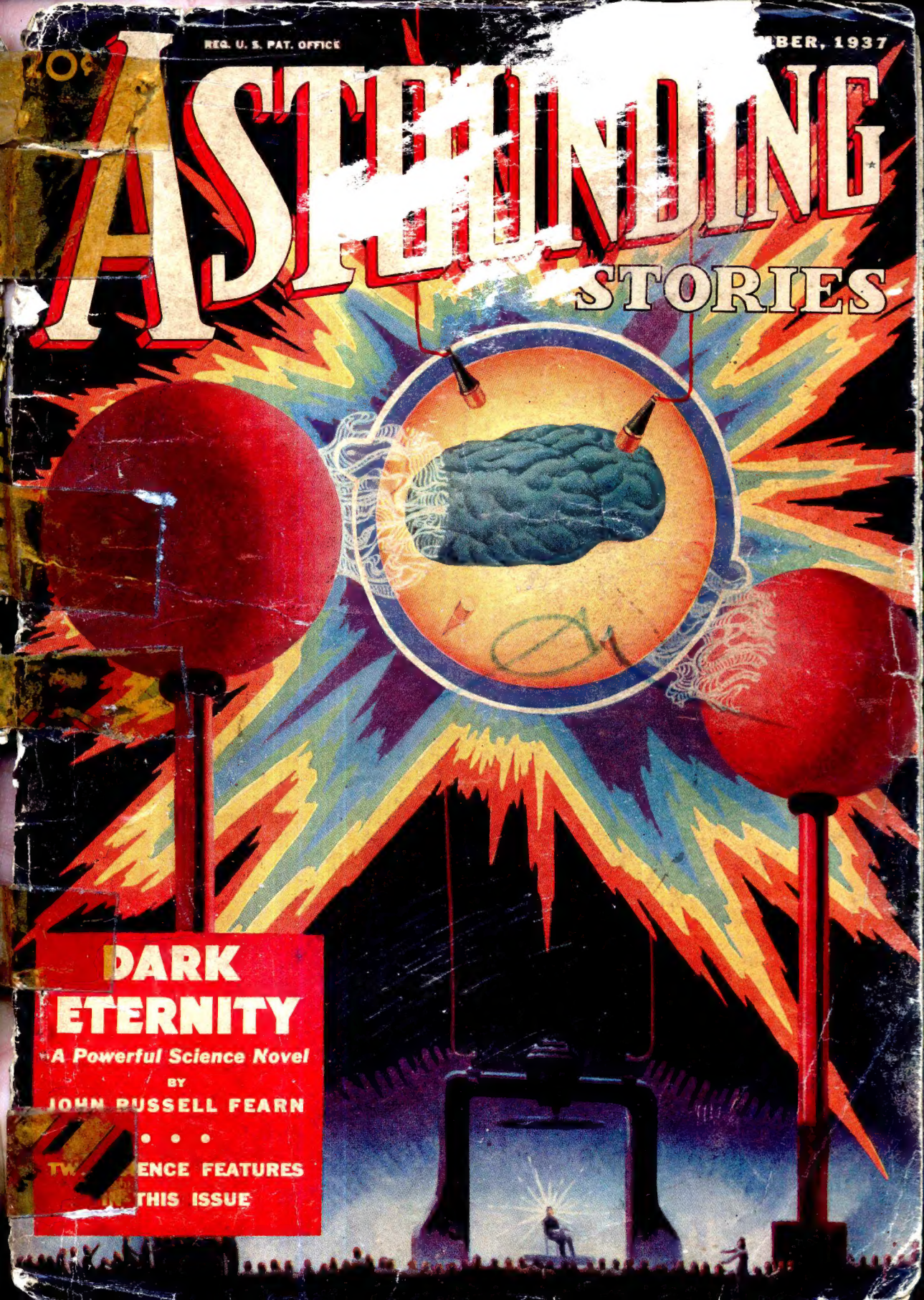
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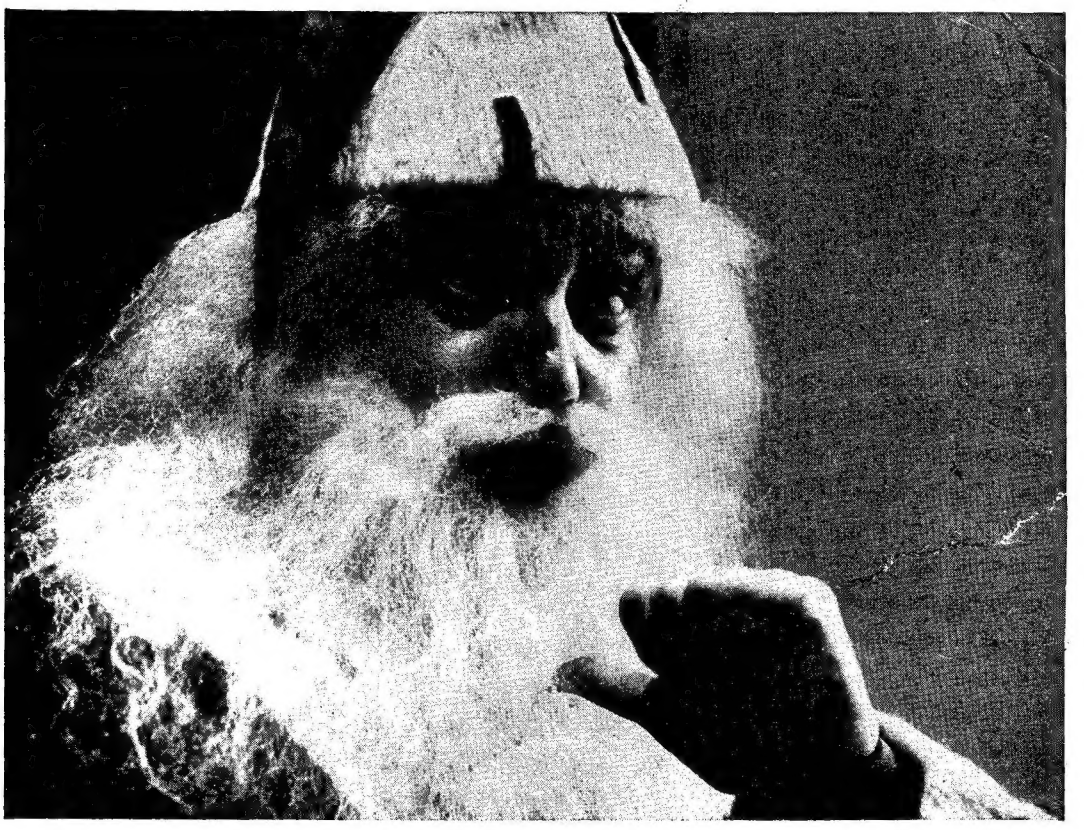
JOHN RUSSELL FEARN

• • •

TW ENCE FEATURES

THIS ISSUE

They asked him to turn in his suit



For ten years Hoppington had acted Santa Claus at the neighborhood Christmas party. A sentimental man, he loved the expansive paternal feeling the role gave him, the laughter of the children, and their caresses . . . And now they were asking him to turn in his suit . . . Olney, a neighbor, was to be Santa Claus this year . . . Hoppington couldn't understand it. They explained it by saying that he ought to give somebody else a chance, but quite by accident, he heard vague rumors that the children themselves had asked for a change . . .

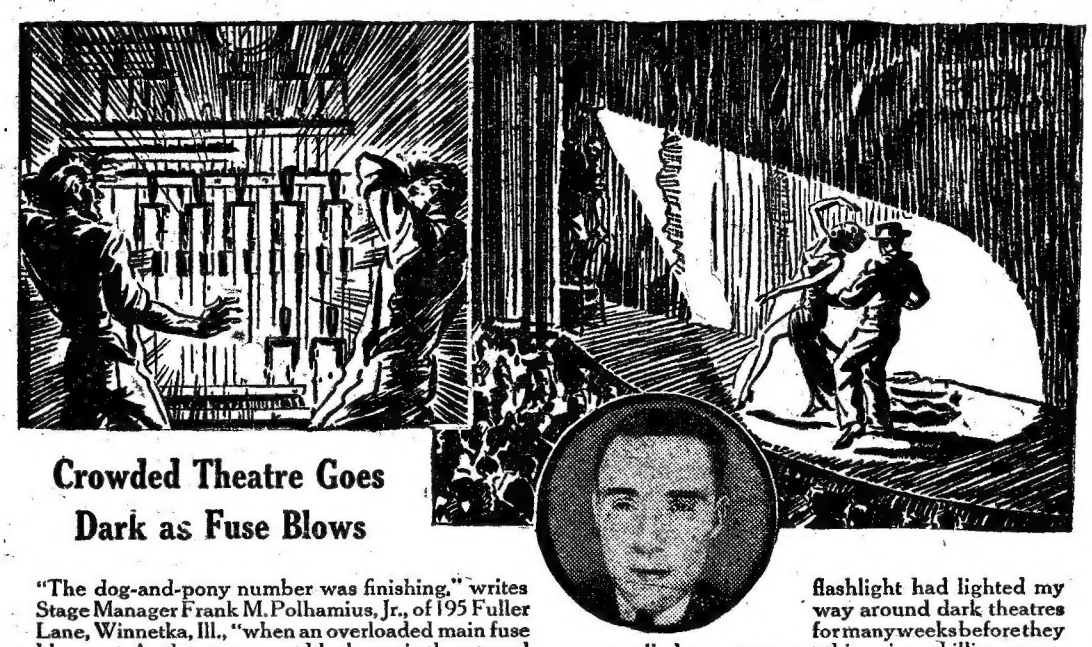
You Never Know

Middle-aged people are more likely to have halitosis (bad breath) than younger ones. Bridge-work, dental plates, digestive disturbances are factors in causing this unpleasant condition, which, by the way, children are the first to detect. Fermentation of tiny food particles in the mouth, of course, remains the major cause. The insidious thing about halitosis is that the victim never knows when he has it.

To combat halitosis, make a habit of rinsing the mouth with Listerine, the quick deodorant and antiseptic. It puts your breath beyond reproach. Listerine Antiseptic cleanses the mouth, gums, and teeth, halts fermentation and overcomes odors it produces. Use Listerine Antiseptic before business and social engagements. Lambert Pharmacal Company, St. Louis, Mo.

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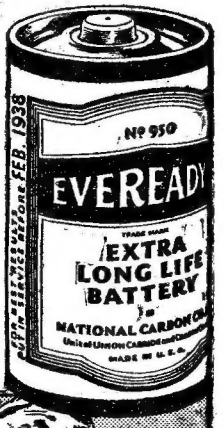
Crowded Theatre Goes Dark as Fuse Blows

"The dog-and-pony number was finishing," writes Stage Manager Frank M. Polhamius, Jr., of 195 Fuller Lane, Winnetka, Ill., "when an overloaded main fuse blew out. As the stage went black, panic threatened the lives of thousands crowding the full house.

"Part of my equipment as stage manager is my trusty 'Eveready' flashlight. Before the audience could sense that anything was wrong, I called for the curtain, dashed to the wings and played my flashlight on the apron of the stage like a baby spot.

"Fortunately, a dance team was ready to go on. In a split second they were on the stage and going through their routine in the spot furnished by my flashlight. DATED 'Eveready' batteries in that flashlight had lighted my way around dark theatres for many weeks before they were called upon to meet this spine-chilling emergency. So you can bet I realized in those critical moments just how much it can mean to buy batteries that are *fresh* and full of life. No one can ever know how many lives were saved by DATED 'Eveready' batteries that night.

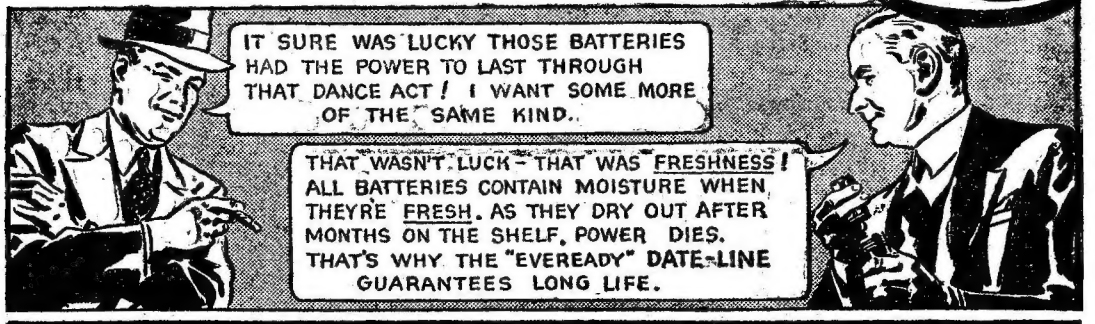
(*Signed*) Frank M. Polhamius Jr."



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ASTOUNDING STORIES

Volume XX Number 4

December, 1937

A Street & Smith Publication

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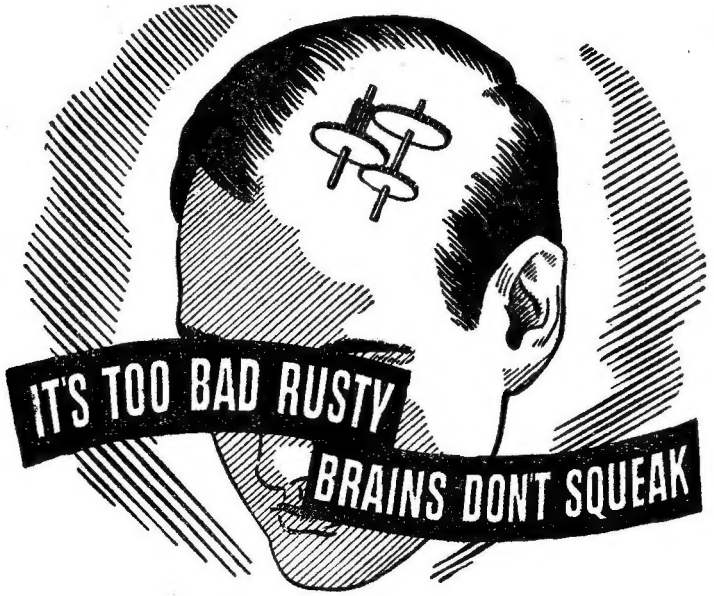
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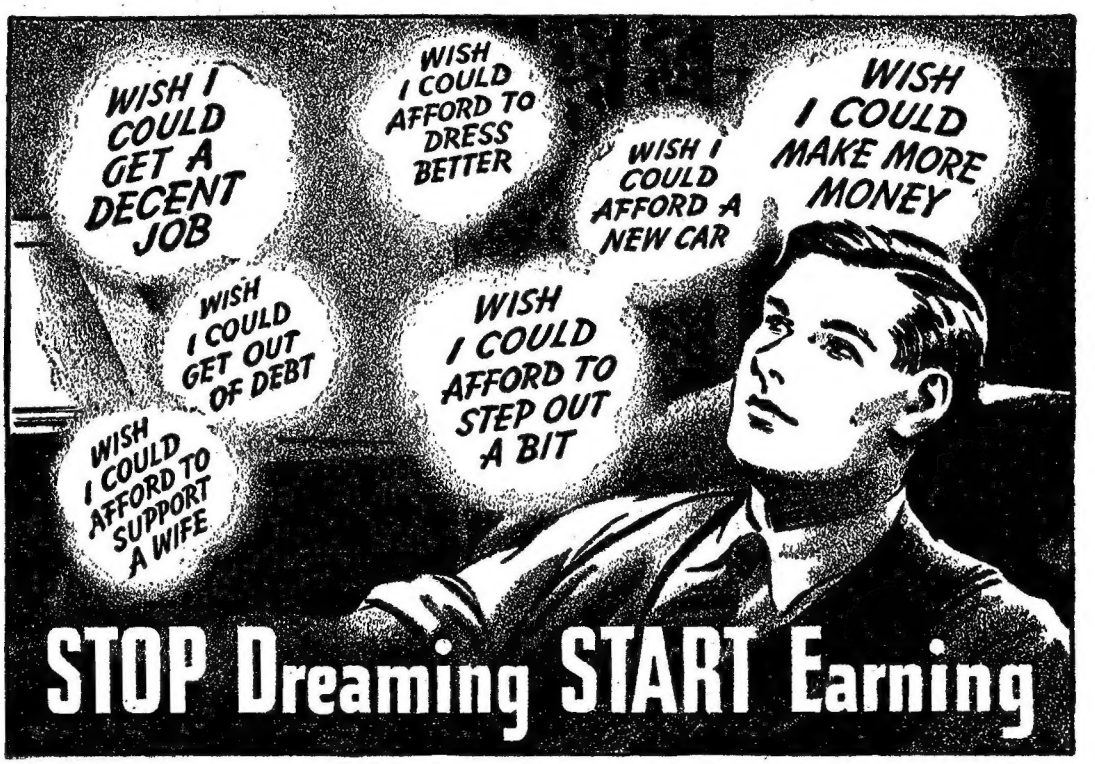
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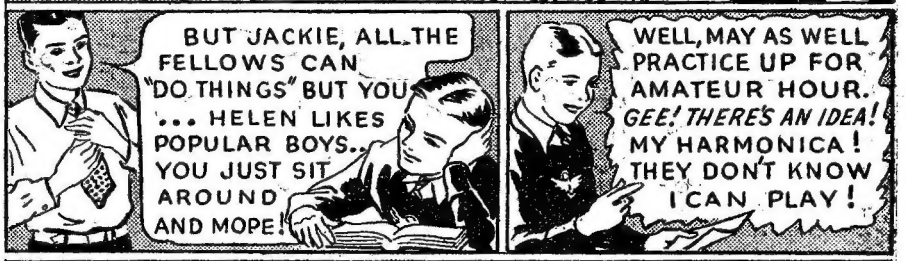
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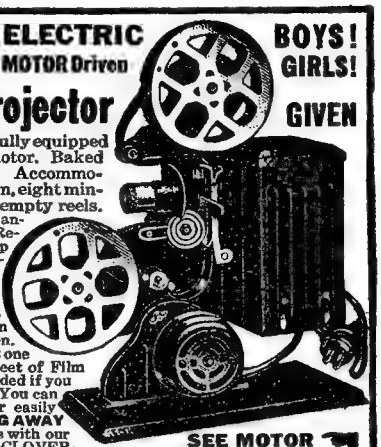
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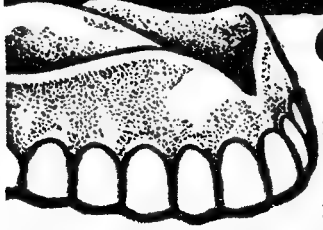
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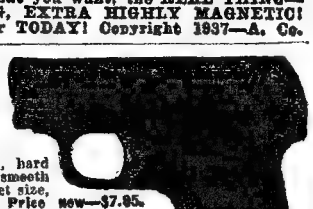
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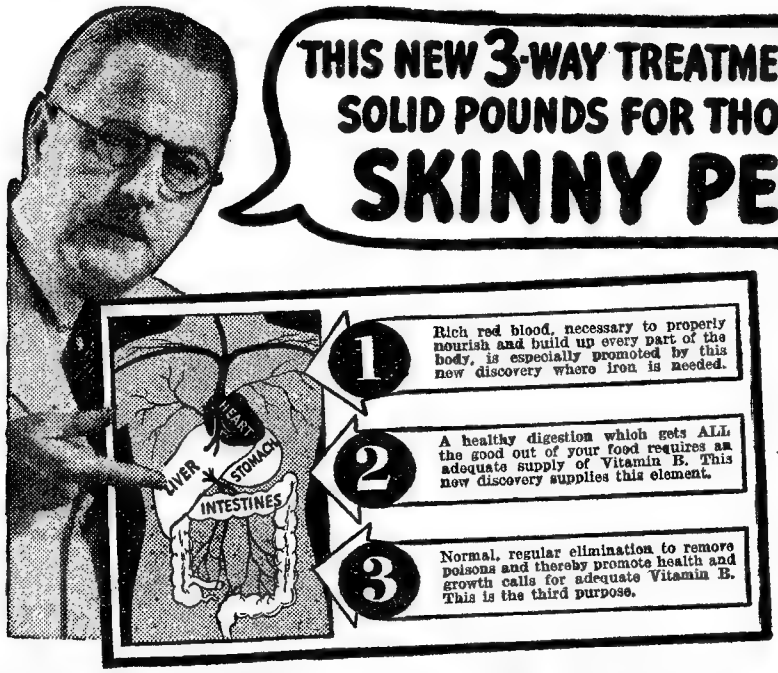
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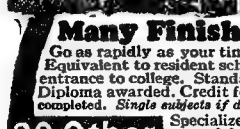
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DARK ETERNITY

by John Russell Fearn

AT THE age of sixteen, Gregory Dunn was admitted as honorary member to the World Association of Psychology; at twenty-one he was professor extraordinary of advanced mental phenomenon in the New York Psycho-Institute; at thirty he was *the* acknowledged authority on the mind and its relation to the universe and humanity.

The people of 2040 listened to his lectures and read his many articles, realizing that in their generation had arisen a genius easily comparable to such past men as Archimedes, Copernicus and Einstein.

Dunn married at thirty-one. When his only son was twelve, he was teaching him the principles of his far-reaching discoveries, nurturing him on primers of psychology and its effects. In fact, it became increasingly obvious that Professor Dunn was a man with an obsession.

Aside from his normal professional life, he drove himself ceaselessly with furious energy upon ramifications of his art. To be a master of psychology was not sufficient for his restless, probing mind. He had to find the cause and effect of the very science he studied. To that end he devoted every waking moment—flogging himself at such a pace that friends and critics alike began to wonder how much longer his short, wiry body would stand the strain.

He labored in this fashion all his life, never taking a holiday, browsing among technical books, re-reading and tabulating everything that had ever been written concerning the mind, working out numberless theories, some of them staggering enough in their import to astonish a nation, but by no means satisfactory enough for him.

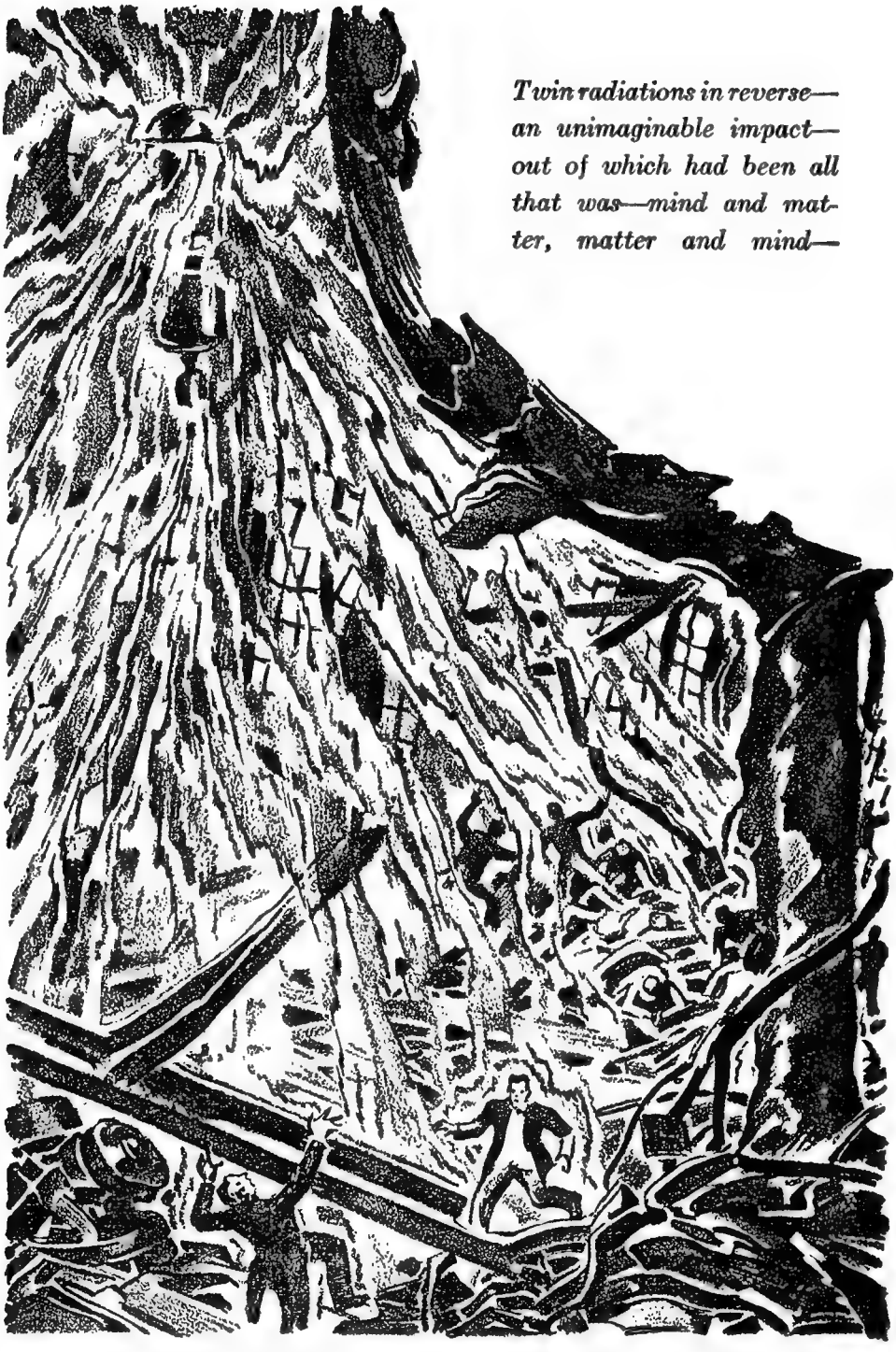
Only once did he ease up through sudden grief at the death of his wife. Then he was back again, more ruthlessly determined than ever, hair a little grayer, powerful shoulders a little more stooped, an obsessed genius eternally striving, struggling, battling—for an elusive something.

He reached fifty-eight before young Allan graduated with honors at the Psycho-Institute and was able to become his assistant. Fresh and youthful, blond-headed, but unhappily with little of his father's rare genius, he endeavored to bind together many of the threads the older man had left scattered, knitting together theory with theory. But he only achieved the framework of the colossal idea his father was striving for.

Young Allan simply could not grasp the profound nature of his father's research. For hours he puzzled over it, blue eyes perplexed, strong young face drawn into a mask of concentration.

THE PROFESSOR pored over sheet after sheet of figures, only looking up now and again to snap curt orders to the rest of the private laboratory staff in his employ. He rarely spoke to his son, not through any lack of sociability, but because his mind was so utterly preoccupied. He did, however, rise far enough out of his meditations one morning to snap almost rudely, "We don't get very far, Allan, while you stand around thinking! There's work to be done—lots of it. What's the matter with you? You don't see me lazing my time away!"

Allan came to earth with a start, then



Twin radiations in reverse—an unimaginable impact—out of which had been all that was—mind and matter, matter and mind—

Free energy hurled itself in writhing streamers—on every possible contact with the Earth.

smiled a little. Going across to the desk, he flung an affectionate arm around his father's stooped shoulders.

"Not lazing, dad, and you know it! Just trying to figure out what you're driving at. Incidentally, don't you think you ought to take it easy for a bit? You're not a machine, you know, able to go——"

"Be damned to that!" Dunn retorted, tight-lipped. "I've got a problem to work out before I depart this life, and I mean to do it! When I do finally move on, I want you to follow in my steps. That clear?"

"Of course," Allan said obediently. But his face was concerned as he noted the burning fervor in his father's sunken eyes, the unkempt white hair, the quivering hands clenched tightly on the sheets of figures. Energy—dynamic beyond belief—was still draining on that aging body and resolute brain.

"If only one could have eternity!" the older man whispered presently. "If only one could have the time to work out a problem instead of being overtaken by such a nuisance as death!" He stopped abruptly, then again became the curt, irritated scientist. "How far do you understand my theory, Allan?" he asked shortly.

"Not very far, I'm afraid. You've delved into the nature of mind more deeply than any man before you. I still cannot see what you are driving at. Maybe I'm dense, but——"

"Decidedly dense!" his father agreed, with an impatient snort. "I've weaned you on mathematics and psychology and you don't grasp the point of my researches! You've knitted my theories together where I've slipped up, and still missed the point. Missed it!" he repeated explosively. "Damn it, boy, you must have grasped *something!*"

Allan hesitated briefly. "Well, I did grasp something, but it's so absurd I hardly dared to mention it. That monograph you put together about the correlation of thought and matter—— Did you mean to imply that they're both the same thing?"

"Of course I did! Different expressions of a monostate—that is to say that they are two distinctly evolved presentations of space. You cannot have mind without matter or matter without mind. The same fault that produced matter produced mind and the two are equally capable of annihilation to the point of them giving up their inter-energy."

"Both?" Allan shook his head. "That's the part that gets me, dad. You just can't annihilate mind! Science is perfectly sure of that!"

DUNN laughed cynically. "Science! You dare to stand there and say that to me? What has science ever contributed to my knowledge? Exactly nothing! It is what *I* have contributed to science that counts! I say that thought *can* be annihilated. I have no intention of actually doing such a thing, of course, but I do intend to release the subatomic energy of thought sometime before I die. To that end I have dedicated my life."

Allan stared into the half-mocking, glowing eyes. The old man grinned sardonically. "Can't take it in, eh?" He chuckled.

"I'll say I can't! No wonder I couldn't find out what you were getting at! But hang it, the subatomic energy of thought sounds——"

"That's what I said. I shall actually accomplish the feat before I'm through. Think of it! The energy of thought! To-day it is a common affair to release the energy of an atom of matter; we span the globe with giant machines by the mere release of energy from several pounds of common sand. Since we have definitely proven the existence of power in matter, and since matter and mind are also interlinked, think of the release of thought energy from a single atom of thought!"

"But you can't!" Allan protested incredulously. "It's—it's fantastic! Absurd! You can't get hold of a thought and dissect it!"

"Now you're revealing your youth," the old man reproved. "For half a century I've devoted my time and energy to proving that I *can,* and no young cock sparrow like you is going to hint otherwise."

"But *how?* Thought is as intangible as—as a vacuum."

"To the normal sight and reason, yes," Dunn admitted. "But if you look around this laboratory, you'll see instruments which do far more probing than is possible to faulty human mechanism. Just as a thermopile can register the slight heat of the moon's surface, utterly undetectable to humans, so my specially fashioned instruments have been able to register the definite formation and vibration of the mind itself. It's anything but intangible, I assure you." He leaned back for a moment with a brief contented sigh. "Will old Maxwell's eyes pop when he sees what I've got!" he murmured.

So that was it! He was living for the opportunity to cut the ground from under the feet of his bitterest critic, Dr. Randolph Maxwell, master psychologist. After thinking for a moment, Allan said, "Suppose, just suppose, that anything were to suddenly happen to you? I know it sounds morbid, but we've got to face facts. What will I have to do?"

"If anything goes wrong with me before my research is complete, you'll do exactly nothing. I couldn't possibly cram fifty years of knowledge into your brain in a few weeks. Obviously you have not got my flair; genius usually does skip a generation."

"Maybe you're right there. But you'll surely tell me how you're going to accomplish this thought-energy release?"

Dunn shook his gray head. "No, Allan. For one thing, I have not the time now and, for another, I'm keeping quiet until I have every detail fixed. I don't think it will take very long the way I'm going on. You keep on working as you are and try to understand. Maybe you'll learn something of my methods. Then one day—one day I'll prove my point!" He meditated briefly, then resumed his notes. "Now get back to work!" he snapped out. "I want you to start assembling that machinery for me. Hurry, boy, hurry!"

GREGORY DUNN was proven to be too optimistic in his beliefs. His assumption that perfection of his scheme would come before very long vanished in thin air as weeks sped swiftly into busy months; as summer and winter came and went unnoticed; as months elongated into a year, then two years—and finally three.

But in that time Allan, stimulated by the few truths he had heard on that other distant morning, had given himself heart and soul to the task on hand, bringing every facet of his scientifically trained mind to bear upon it. The more he explored his father's research, the more he marveled.

The old man had actually eliminated all the vagaries connected with mental phenomenon and gone right to the central core of cause and effect. There was, of course, much that was puzzling, that would demand the old man's own elucidation. But in the main Allan began to discover that thought was no longer an abstract, unknowable state—a mystic font of all creation—but just matter in a different form at a different vibration.

Here and there, as he worked through the various postulations, he found concrete evidence of basic laws, supported by statements from such past experts as Eddington and Jeans—and further back still—Kant and Aristotle. Mathematics, thought, energy, time and space were more than interrelated. They were the varied products of the same thing, in

much the same way as different species of animals and humans are, in truth, evolved offshoots of an original primal atom of matter.

So much Allan grasped of the theoretical side. The rest was still a mystery. He would have to wait the old man's full discourse to the masters of the profession—the discourse that Dunn hoped would wipe out all the opposing theories of the didactic Dr. Maxwell completely.

Allan found the mechanical side even more complicated. He worked entirely to his father's plans and in a newly equipped annex to the private laboratory, he began the erection of two immense cylindrical pillars, eight feet in width, insulated by succeeding layers of the most nonconductive materials known to science. At the top of each column was mounted a hollow globe—sixty feet in diameter—composed of highly polished aluminum.

Between the spheres themselves—held horizontally in a metal cradle hanging by chains from the lofty ceiling—reposed a vast vaccum tube, the central unit of one of the most efficient atom-disrupting machines ever made.

Both spheres, Allan judged, were to be the source of the atom smashing. Within them was heavy machinery—controlled from the laboratory generators and switchboards below—for carrying an endless series of minute electrical charges at 30,000-volt pressure, building up gradually within the spheres to a potential state and capable of achieving a maximum power of 17,000,000 volts each—nearly 4,000,000 volts higher than science had so far reached in its atom-smashing activities. Allan brooded upon the reason for such terrific power and once again could only assume that dealing with mental causes had something to do with it.

Clearly, the throwing of the master switches would release a combined force of 14,000,000 volts, maximum, from positive and negative terminals, sufficient to shatter completely any known matter placed inside the bombardment chamber of the vaccum tube.

In the tube itself—entry being gained from either of the two spheres—was a curiously fashioned globe of almost transparent metal, made in two flawless hemispheres and cramped immovably together by the four-sided grip of a powerful-jawed matrix. Welded through the cylinder were four terminals—designed to receive wire connections—converging on its inner side into brightly polished concave bowls, four in all, so designed that their combined foci pointed to the exact center of the ball.

LOOKING along the line of sight, Allan could distinctly observe that the bombardment of released energy would probably shatter the transparent sphere and hurl its results into the complicated receiving chamber beyond. But what was to be within the sphere? That was the point at which he balked——

Puzzled though he was, he went on steadily with the work, studying every part of the machinery as he went, supervising the assembly of the power generators and, in particular, a massive, straddling conglomeration of machines that, in basis, reminded him of those in force at a radio transmission station. In every instance, however, the myriad wire connections led to step-up transformers designed in series, connecting in turn with the major wires leading to the vacuum tube spheres.

Converging to a central transmission point, all the machinery seemed to have its main focus above a light aluminum chair—an absurdly orthodox thing in such a wilderness of engines—supplied with broad arms studded with numbered buttons and switches. Poised over the top of it was an odd, flawlessly balanced rotor composed of six fan blades, highly magnetized and made up of the same semitransparent metal as the ball in the

vacuum tube. When the thing was in action it would whir soundlessly over the head of anybody sitting in the chair, apparently transmitting its results—whatever they might be—to a minute microphonic pick-up in the box on top of it, and thence to the transformers.

Allan was convinced by the time he came to the end of the various erections that he knew less than when he had started. His father's privately acquired fortune must have been drained to rock bottom by the purchase of such devices. He found the old man still uncommunicative and only received grunts when he announced that the machinery was finished.

He was not even permitted to enter the great laboratory once his erecting task was over. But on many evenings afterward, he heard the thunderous, crackling roar of enormous energy discharges and could feel the brittle sense of static in the air as his father put the finishing touches to a lifetime of study and concentrated effort.

For he had at last gained the goal he sought. He became almost fanatically eager as he announced the fact exactly six weeks after the final completion of the machinery.

"I've got it, boy!" he declared, pacing nervously up and down the laboratory. "This is the thing man has been waiting for! A lifetime of work, but worth every hour, every second that I've packed into it. To-morrow I demonstrate!" He looked up with quick decision.

"Of course you've invited Dr. Maxwell?" Allan asked rather dryly.

"All of 'em," Dunn said. "Maxwell, Van Linman, Crawford—they're the main ones. The others will come along as a matter of course. To-morrow, Allan, I announce everything to the world—the cumulative result of my studies. It'll be your legacy, too, to use well and keep away from the hands of dabblers who don't know what they're doing."

"I'm afraid I know no more than they do in my present state of ignorance," Allan stated briefly. At that the older man looked vaguely shamefaced.

"Perhaps I have been rather selfish," he confessed. "Still, I have been so locked up in my work I've been disinclined to explained anything without concrete evidence. You know how it is! But now I have that evidence—the ultimate truth about mind!" He stopped, eyes gleaming speculatively; then he said briefly, "Take to-day off if you want, Allan. The demonstration takes place here at ten to-morrow. I have to fix some special materials in the vacuum globe, ready for to-morrow—brain material!" he said. Then he shuffled pensively away and left Allan staring wonderingly after him.

II.

EXACTLY at ten o'clock the following morning the scientists and newspapermen began to enter the demonstration laboratory. Professor Dunn greeted them one after another with a handshake and a faintly cynical smile on his face—a smile which broadened significantly as he shook the hand of Dr. Randolph Maxwell.

The tall, torpedo-bearded scientist looked at him keenly with his piercing gray eyes. "Trying to spring some-new again, er, Dunn?" he asked. "I've made a long trip from Los Angeles, so it had better be good."

"It will be," Dunn assured him calmly. "If you will be so good as to take your reserved seat in the front row you will, I think, find your trouble in coming here amply compensated for."

With a rather indifferent shrug Maxwell moved slowly across to the railed section of seats, settled himself between Van Linman, the bald-headed psychologist, and Crawford, the atom annihilation expert. Both men kept their own counsel and disregarded the well-chis-

eled, decidedly cynical features of the expert between them. As a psychist Maxwell was superb; as a man he was a complete anathema, bitter to the point of hostility when confronted with theories that did not agree with his own.

At length the full assembly was complete. The gentlemen of the press sat in a section to themselves, silent but interested, speculative eyes on the grouped masses of machinery. Then their notebooks flashed into position for action as Dunn quietly closed the laboratory door and stepped forward, leaving Allan to supervise the waiting engineers.

"Gentlemen," the professor said quietly, clearing his throat, "I shall go directly into the nature of my theory, under the assumption that you know already, through the newspapers, about my machinery and its infinitely superior atom-smashing power. In the first place, as you well know, I have devoted my life to the study of thought. I have definitely proven that mind, matter, energy, radiation—anything you care to mention—are *all* evolved products of the same thing. They all sprang from the accident, the original fusion of radiant energy wave lengths of 1.3 x 10-13 cms, in the very core of commencing time and space."

"The conception is not altogether novel," remarked Maxwell, peering from under insolently drooping eyelids.

"I did not infer that it was!" Dunn retorted acidly. "But I do assert that thought is just as capable of being disintegrated as matter is. Like matter, it can be patterned into any desired form. Mind can become matter, and matter can become mind."

"Rank nonsense!" exclaimed Maxwell sourly; but he was alone in his condemnation. The others were listening intently, particularly Allan.

"In the first place," Dunn went on, ignoring the interruption, "matter is impossible without mind. Conversely, without mind there cannot be matter. That everything we know and understand is simply through external impression—transmitted through light waves and interpreted by the brain—is an old and accepted theory. Remove the process of sensation, sight, hearing, and all the physical attributes, and what have we? Nothing!"

"But we can still imagine plenty!" Van Linman put in quickly.

"You can only imagine something based on former experience," Dunn pointed out. "That you cannot disprove—not even you, Dr. Maxwell!"

THE PSYCHIST smiled bitterly. "So far you've merely recited established facts, Dunn. You'll have to be more convincing than that."

"I will be. You will admit, no doubt, that the waves of probability of an electron shade off into other-dimensional space?"

Maxwell nodded, but his bearded lips said "Old stuff!"

"Very well. The correlation of that shading off occurs in mentality where it slides off into the subconscious realm. That state is identical with the electron's own veerage."

"An unique analogy, but hardly satisfying," commented Crawford. "You still evade the issue. The nature of thought, the——"

"I'm coming to it," Dunn interrupted. "Of necessity I have to go a long way round with such a subject. We know that our entire universe is naught but waves, be they light waves or electron waves. We know that the very basis of matter is purely waves. Certain of these waves reach visibility to our eyes and we call them matter. Be it a cabbage or king, it is still matter. But others of these waves, invisible to the human eye, but just as surely interconnected with matter, are the waves of thought, apprehended by only one organ in the body—the brain. And with those waves we can do things, things which include

creation, hypnotism, mental telepathy, and so forth. We can give birth, mentally, to characters we have never known —take the great literary artist for example. And could we but understand these waves aright, we could instantaneously transform a mental creation into a matter creation, as surely as to-day we transform matter into pure energy."

"And, of course, you can do this?"

Dunn nodded slowly and stood smiling slightly at the chorus of gasps around him.

"It's absurd!" Maxwell cried hotly, rising up. "You dare to suggest such a theory to—to intelligent men? We, who have proven the utter untouchability of thought! Why, I——"

"Sit down, my dear sir," Dunn suggested coolly. "Proof of my assertions will shortly be forthcoming. In the meantime, let me explain further. Any wave in ether—or at any rate in the medium we call 'ether' for want of a better name—is basically composed of electrons and atoms. All of them are invisible, but those whose aggregates build up into sight formation we call 'visible matter-things;' those whose ultimate vibration remains beyond visual perception we call 'mental.' But the fact remains that both states have basic atoms and, therefore, are capable of annihilation and release of energy. In the one, matter energy. In the other, thought energy."

"Since they are both basically electrical, how do you expect to get anything but electrical energy from either of them?" Maxwell asked.

"Because if I scooped a bucket in a pond I wouldn't expect it to come up full of soil," Dunn blandly answered.

AT THAT there was a faint chuckle of amusement from the newspapermen, increasing as Maxwell stood glowering down on the savant.

"Meaning just what?" he demanded heavily.

"Meaning that matter atoms release the electrical essence of matter energy because they *are* matter atoms, and meaning that thought-energy atoms will release the essence of thought energy because they are thought atoms. The mental atoms and their waves create all our powers of perception—they bridge that mystic gap in the brain that lies between seeing a thing and interpreting its nature. They are at the basis of all conception, ideation, creation and imagination. And where necessary, the brain control of these waves can make mental conception become a physical realization."

Maxwell cried, "Such balderdash! You expect us to believe *that?*"

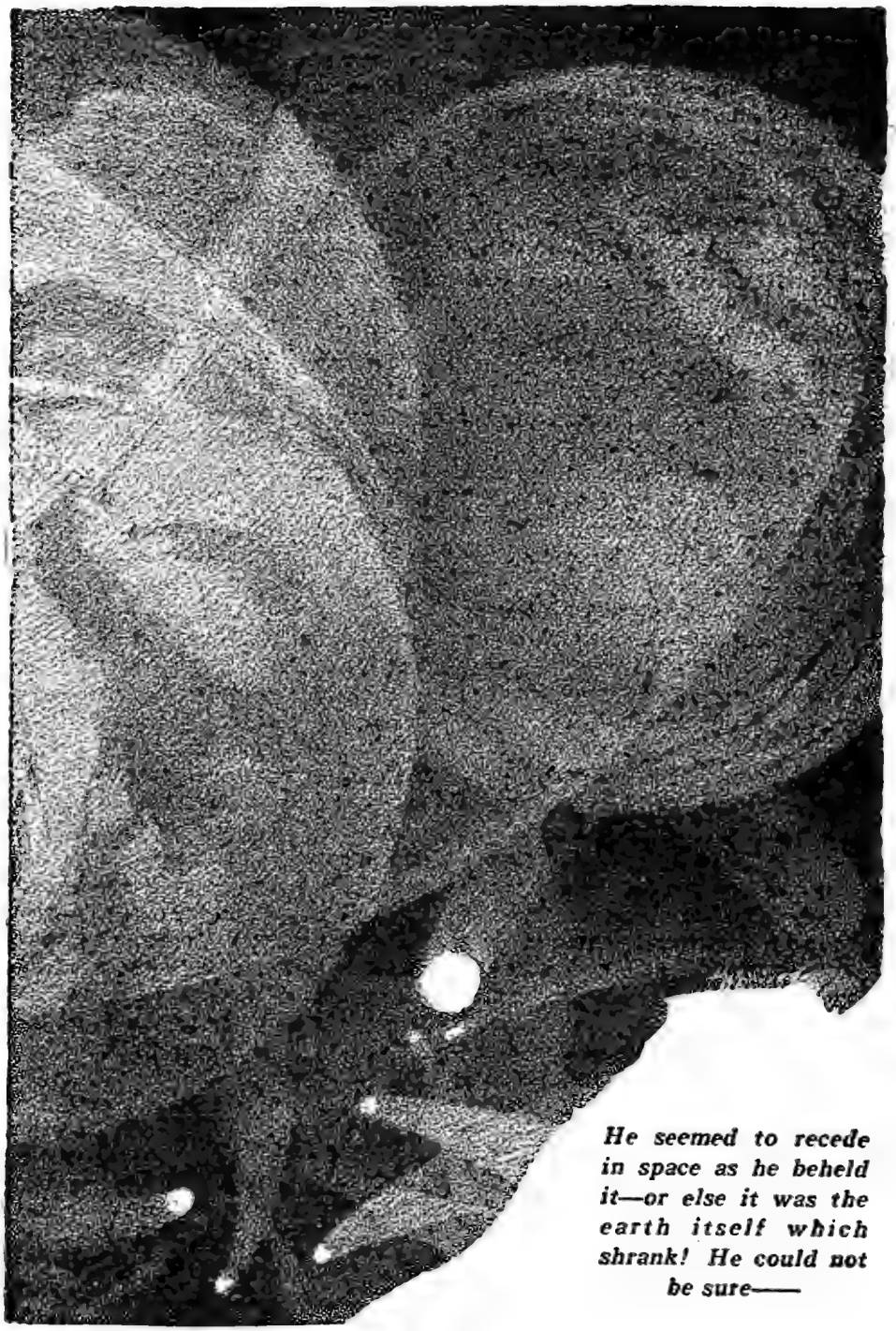
"I'll show you," Dunn said, turning aside. He walked across to his aluminum chair and sat in it. Operating the switches on the arms, he set the bladed rotor twirling over his head.

"This," he said quietly, "is a mental wave pick-up, so designed that the invisible play of waves from my brain—the tiny electrical impulses—are passed to it and transferred as potential to the two spheres you see up there. Normally, those spheres are used for normal energy, which you will see later. This is merely a side line to the main experiment to prove my point." He turned and raised his thin hand. "O. K., Allan!" he cried.

Allan nodded and gave the signal to the engineers. The various machines, operating only on 75% of the power used for normal atomic disruption, began to hum softly. The rotor span with swift, easy revolutions. In silence the audience watched, studying Dunn's lined face as he sat concentrating for nearly seven minutes. Then he gave the halt signal and rose to his feet.

"Now, gentlemen," he said, "the essence of the thought waves radiated by me is stored as potential in those spheres. In the vacuum tube globe, as you can see for yourselves through the





He seemed to recede in space as he beheld it—or else it was the earth itself which shrank! He could not be sure——

inspection plate, is a mass of nerve tissue representing the materials found in a human brain. Once the master switch is thrown here the force of those potential mental waves of mine will strike on that inert substance and pattern it instantly into the thing I have mentally pictured—a human brain of considerable size. Is that clear?"

Maxwell folded his arms obstinately. "Well, what are we waiting for?" he asked shortly. "Let's see your conjuring trick."

With a chuckle Dunn turned aside. "What's the reading, Allan?"

"Potential 50,000 volts mental energy," Allan crisped back, scanning his meters.

"Do not confuse thought energy with normal-energy readings, my friends." Dunn smiled, looking round. "50,000 volts of mental energy is quite high, believe me! Now, let us see——"

He turned swiftly toward the master switches and clamped his hand down on the principal one. Dryly he said, "Watch the target chamber of the tube, Maxwell. You're sure you can see it clearly?"

"Go right ahead," the irritated psychist growled, and sat with beard projecting and face elevated in the air.

A silence fell on the laboratory; every eye directed itself to the vacuum tube's inspection chamber. The generators of the strange contrivance hummed with sudden vigor. In one clean movement Dunn slammed in the master switch.

IMMEDIATELY the energy flared brilliantly from positive and negative spheres, burst in a crackling, crisping roar in the target chamber. For a fraction of a second the daylighted laboratory was bathed in a brilliance comparable only with the sudden ignition of large quantities of magnesium—then the disturbance died away and the engines stopped their droning.

Petrified, the spectators stared at the flawless brain clearly visible in the transparent globe, reposing exactly in the same spot as those former synthetic tissue elements. Maxwell sank back in his chair for a moment with a gasp, his lips tight behind his beard. He ignored the excited conversation of the assembled scientists, the chattering of the newspapermen. For the life of him he could not take his gaze off that thing of gray. The voice of Dunn seemed to reach him from a great distance.

"Well, my dear Maxwell, are you satisfied?"

He jerked himself into action. His cold eyes looked away from the brain to the savant. "I don't believe it!" he stated flatly. "All you've done is perform some damned clever conjuring trick! It just can't be done!"

Dunn was not annoyed, he merely shrugged. "You'd better examine it for yourself. Allan will show you how to enter the target chamber from the sphere. But take care you don't touch that brain. It's alive."

That was the last straw for Maxwell. He shot to his feet. "Alive!" he yelled.

"Certainly. Matter life is entirely at the dictates of mental waves. I willed the power of life into the energy that begot that brain, just as I fashioned it with my own concentration. Life is not a matter of hearts, lungs and blood. Life is an accidental arrangement of chemicals—a fortuitous concourse of atoms, as the experts call it. That atomic arrangement of life can quite easily be forced into being, be patterned, by mental waves. Don't forget the miracles of old. Don't forget how the belief in illness, particularly in the case of a hypochondriac, can produce the identical physical results. There you have a small example admitted in every medical realm."

Maxwell hesitated on something, then he tugged his beard fiercely. "Either way, I intend to examine that—that brain!" he announced curtly.

Dunn bowed pleasantly and signaled Allan. The young man was as curious as the elderly psychist he guided up the ladder into the sphere. Together they stood looking in silence on that palpitating thing of gray in the matrixed globe of the target chamber. Beyond question it *was* a brain, definitely human in shape but far beyond average size. Even as they stood beside it they could feel a certain aura of compelling mental force radiating from it.

MAXWELL turned away at last, his face astounded. Behind him the other scientists and eager reporters retreated, talking excitedly. Once down on the laboratory floor again the psychist regarded Dunn steadily for a moment, then with a sudden impulse held out his hand.

"I'm afraid I've been something of an old-fashioned fool, Dunn," he said very quietly. "I know a brain when I see one, and the only way that one could ever get into that globe is by the method you used. But man alive!" he went on incredulously, "think of the possibilities! To create whatever you choose at will and——"

"Ah, but that isn't exactly the idea." Dunn smiled. "The real demonstration has yet to come."

"So."

"I intend to annihilate that brain with 14,000,000 volts of energy, destroy the very mental atoms of its composition and release the intra-atomic energy of thought."

"But why? If you can create these things——"

"To create such things is but to scratch the surface of a vast unlocked core of mental power. The brain there is material, of course, but within it—even as inside our brains—repose myriad of mental atoms, the transparent matter electrons, of which I told you. My electricity here will store up a potential of 7,000,000 positive and 7,000,000 negative in either sphere. Before it leaves the generators it will pass through special transformers which will alter its frequency to that of the mentality atoms."

"And the release of this thought energy goes where?" Maxwell asked.

"You noticed that the brain lay within a globe and that the globe was fitted with four concave reflectors with their foci directed on the brain's center?"

"Yes, but what——"

"That globe is probably the most unbreakable, yet transparent, in existence. It is made of *tyuminite,* an extract of a rare Antarctica mineral deposit. It is built in two interlocking hemispheres, both of which took twelve years each to grind and shape. The entire globe will withstand the force of 14,000,000 volts energy because it allows free passage of force between the molecules of its construction. But whatever is within it will be utterly shattered and release itself in energy—in this case the brain's thought energy."

"You mean that the thought energy will be released and be unable to escape the globe, but that the brain shell will be left behind, devoid of mentality?" questioned Crawford.

"Just that; but the brain shell will disappear because the only thing holding it in consciousness is itself—its knowledge of *being.* It is storing thoughts and impressions right now like any ordinary brain. Afterward, the globe will be removed and by means of the wired terminals and inner contacts passing through it, it will be enabled to release its thought energy little by little into machines specially designed to absorb it. I'll show you those later. Now let us begin. It will take an hour to store our potential energy, so while that is taking place you must have some refreshment."

Dunn turned aside and signaled Allan. Immediately the generators commenced

their whining. Within the immense spheres the machines began their gradual building up of potential energy——

III.

AN HOUR later Allan announced that the potential reading for each sphere was 7,000,000 volts. It was the signal for the scientists and newspapermen to return to the laboratory and resume their seats.

The change in the manner of Maxwell was plainly noticeable. From being sour-faced and critical he had become almost eager. But his face was concerned as he asked, "Are you sure your tube will stand such a terrific blast as 14,000,000 volts?"

Dunn turned from the switchboards with a shrug. "According to all my tests it should certainly do so. If not—well, another tube will be built, that's all. Science never acknowledges defeat."

He grasped the main switch and glanced at Allan.

"All set, dad. Both spheres identically charged."

Dunn hesitated for a moment, glanced at the silent but living brain high up in the tube target chamber, then jammed in the master switch.

Immediately the tearing, battering fury of man-made thunder and lightning burst free in the great tube. Its enormous length became a brilliant, blinding furnace of raging varicolored light. Crackling din deafened every ear; an enormous surge of static energy sent a crimping sensation through the hair of everybody present.

Then above the din Allan gave a hoarse shout. "Dad! The tube's cracking! Look——"

The professor didn't answer. He was standing gripping his switch fiercely, staring with unbelieving eyes. Beyond question the tube *was* breaking. A slow fissure had appeared along its length from the center, warping swiftly with the seconds from that main core of unguessable energy impacts——

"Run for it!" Allan cried desperately, racing toward his father.

But he was too late. At that identical moment the enormous tube shattered outward in a spraying fury of glass shards. The din of a terrific explosion gushed through the laboratory, hurled back newspapermen and scientists in a scorched, blinded jam, ears deafened by the hellish noise.

Walls quaked under the force; instruments collapsed. Free energy hurled itself in momentary writhing streamers on every possible contact with earth. Something ground and rended mightily.

Then came silence—a tense, uncanny silence, all the more potent by reason of the din that had preceded it.

Allan stirred weakly from the floor and pushed away a metal strut that had fallen across him. His hand found a freely bleeding cut on his cheek. Scrambling to his feet, he stared dully around him. On every side was crumbled wreckage. Only the walls of the laboratory were left standing; the windows were cracked to pieces. The huge vacuum tube was utterly shattered; the energy spheres were slued at a drunken angle, torn wires draping around them.

HIS GAZE went swiftly over the struggling scientists and newspapermen as they got painfully to their feet, some of them bleeding, others hardly scratched. Maxwell rose up with his gray hair hanging absurdly down his face, his collar torn from its stud. So much Allan grasped, then he caught sight of his father lying prone on the floor, half covered by a fallen girder support from the tube.

Long before he reached him Allan instinctively knew he was dead. He knelt beside him—involuntary tears in his eyes—tugging uselessly at the girder. The dead face of the scientist was half smiling; one thin hand clenched a

broken piece of switch. Death must have been instantaneous. The weight of the girder had crushed the life out of him.

The rest was a blur to Allan. Maxwell, aided by Van Linman and Crawford, worked desperately with the newspapermen to raise the girder. It took ten of them to do it. The body beneath was hopelessly crushed.

Maxwell shook his head bitterly. "He ought never to have used such power!"

"But what caused it?" Allan shouted hoarsely, abruptly coming to himself. "Why did such a thing have to happen on the very verge of success? Why did——"

"It was the terrific power, boy, nothing else," Maxwell muttered. "I half expected it——" He turned and looked upward. The assembly did likewise.

"The brain's gone, anyhow," muttered Van Linman. "It must have been annihilated. Wonder if the mental atoms were able to release their thought energy?"

"I no longer care one way or the other," Allan said hollowly. "The whole experiment's a failure. It's brought nothing but disaster and the death of my father." He tried to get a hold on himself. "Give me a hand to carry him into the house, will you?"

Nobody spoke, but with a certain reverence the disheveled, blood-stained men moved forward to obey his behest.

THE NEWSPAPERS carried the fullest details of the explosion at the laboratory, lauded Professor Dunn's achievements up to the skies, and closed with the regret that he had died and taken his profound knowledge with him. For Allan, though he knew the outline, would need to still study for years before he could possibly rediscover from his father's notes the secret of matter creation from thought.

Not that he had the inclination in any case. The accident that had killed the old man and brought an abrupt end to his magnificent researches had made Allan embittered and disinclined to pursue that particular field any further.

Instead, he devoted his time to normal physics and left mental mechanics severely alone—until one day, to his great surprise, he had a visit from Dr. Maxwell. The psychist's face was very serious; only something of grave import could possibly have brought him 3,000 miles from a busy professional life to the scene of that earlier disaster.

Somewhat puzzled, Allan accompanied him into the house. Over his glass of refreshment Maxwell regarded him seriously.

"Allan, I'm here as a direct result of chance observations I have made over in California, also because of a rather alarming theory I have in mind. In brief, in various parts of the country, but in California in particular, certain vital plants of the lower species have ceased growing—ceased growing *now,* at the most fruitful time of the year! And what is more, they are disappearing!"

Allan managed to state a polite "Really?" He gazed at the lean-faced scientist in vague bewilderment.

"That seems a small thing, doesn't it?" Maxwell went on, draining his glass. "On the contrary, though, I believe it to be the most significant thing that ever happened! Plants, we admit, have a certain power of instinctive thought, have they not?" Allan nodded slowly, frowning.

Maxwell went on, "They also represent the least intelligent form of life. After them come the more intelligent germ life—the amoeba, the animalcule, and so forth; after that, the animals; after that again, man—the highest state. Now suppose some power, starting at the bottom of the intellectual scale, were annihilating the power of thought completely? Plants would cease to grow at first, would they not, and then disappear,

for they would have no power of conception to hold them in being?"

Allan looked startled. "I suppose that's right, but—— Look here, doctor, what on earth are you getting at?"

Maxwell leaned forward earnestly. "Just to the fact that I think your father's experiment with mental atoms *was* a success of the most disastrous kind that ever came to our knowledge! He converted me into a firm believer of his magnificent scientific ability—so much so that since the accident I have thought of little else but that effort to release intra-atomic thought energy. Suppose, though, instead of just shattering the atoms, he utterly blasted thought energy itself back into the state from which it originally evolved? That, in the case of the total destruction of an atom of *matter* and its energy, would mean the slow collapse of the known universe. If it can happen to a matter atom, then, as science has fully proved, there is nothing to stop it happening to a mental atom. You see my point?"

ALLAN sank down rather weakly into a chair, trying to grapple with the psychist's cold logic.

"But how can such a thing have happened? My father had every detail at his finger tips——"

"I'm not saying he hadn't, but the best of us can err, especially in so complicated a matter as thought. The dividing line between releasing intra-atomic energy and forcing it back—telescoping its evolution to a primal state—is amazingly slight, as our own scientists well know. Some fortune has always saved us so far from utterly annihilating a piece of *matter* into its primal state. But it's beginning to look as though no such fortune favored your father's experiment. He clearly stated, and there is much to substantiate him now, that matter and mind are evolved products of the same thing at different vibrational rates. Both states have progressed uniformly from one point, and that point was No Thing. Do you understand?"

"I know nothing against it," Allan confessed.

Maxwell considered briefly. "Well, I've worked out a theory, and my only hope is that it's wrong! If your father created primal thought energy—an energy existing at the time of our universe being born—it will mean a gigantic shifting, a veritable dëevolution through the whole structure of intelligence itself. And since matter cannot exist without intelligence, it means that that will be destroyed, too!"

Allan's face blanched. "But that cannot be!" he cried hoarsely. "Such a thing just couldn't happen!"

"Unfortunately, it could," Maxwell said gravely. "That energy was not trapped as was intended. It was allowed to go free, to seep out. Inside that brain was the energy of incalculable numbers of mental atoms. Millions of years of mental evolution must have instantly telescoped into primal energy, such as could only have existed in the beginning. It will destroy the very structure of mentality, until finally—well, we don't know what will take place. Obviously, the least intelligent things will go first. The higher states will come afterward as the energy finds a more uniform level and re-patterns everything to its original formula. That original formula is literally nothing—the substance of emptiness, if I may use the phrase—the state that must have existed before our primal atom exploded and evolved into mind and matter."

"Good Lord!" Allan breathed weakly, staring before him. "And—and there's no telling where these things may happen! The energy will have spread out, impacted with mental waves both great and small. You think that those disappearing plants are the first signs?"

Maxwell brooded. "What else? There is no other possible explanation. What we've got to do is to go through

your father's notes, examine the situation in every aspect, and see if there is not some possible way of averting this disaster. He of all people could probably have found a negative result——"

His face became suddenly earnest. "Listen, Allan! I'm willing to sacrifice all my time and energy to solving the problem. I've made arrangements for a prolonged absence from Los Angeles. We've just got to try and find a way to avert this disaster!"

"Dad's notes are all in the library," Allan said, a little dazedly, as he got to his feet. "Come along with me."

JUST AS MAXWELL had feared, however—and Allan too, though he had not openly admitted the fact—the dead professor's notes proved too complicated to follow at short notice. It would demand the work of years to follow all his theories. Even if that could be accomplished, there was no telling how much longer it would take after that to produce a negative result and circumvent the grim thing that had happened. There simply was not time.

The fact became evident to the two after three days and nights of continuous analysis of sheet after sheet of abstruse formulæ. At the end of the time, sleepless and exhausted, they were forced to the realization that they were no nearer than when they had started.

Allan looked at the psychist's lean face anxiously. "Supposing—supposing you are right?" he said dully. "How long have we before we're overtaken?"

Maxwell slowly shook his head. "How can I say? It is not in my power to outline the activity of a primal energy. It may do anything! It may achieve some strange level of its own and leave us free. But on the other hand—and the most likely occurrence—it will force things back to an original state. It will undo the work of the accident that started the universe. Maybe only weeks—maybe centuries. We cannot tell."

He fell silent and they stood looking helplessly at each other, surrounded by their piles of useless data.

IV.

MANKIND IN general was not immediately aware of anything unusual interfering with its daily progress. Most of the vital news had been suppressed by Maxwell himself. But here and there certain famous dailies asked trenchant questions. They demanded to know, for instance, what was happening to plants and orchards in various parts of the country.

Not only in the United States, but all over the world there were distinct signs of plant failure, followed immediately afterward by a complete disappearance. At the start such stories were put down to over-imaginative reporters or to the visions of a drunk. But when a 300-year-old beech tree vanished overnight from the garden of a famous senator, leaving pure undisturbed earth behind it, the matter took a serious turn. The senator was famous. He could not possibly have been drunk. Science was called upon to explain.

There was no success in this direction. Maxwell and Allan Dunn, the only two who could give the truth, purposely refused to do so. It would only mean the precipitation of a panic. But they forgot that perhaps one of the reporters attending the earlier experiment might form a theory. Blake, of the *Times,* actually did so and ran a feature article on the subject, clinging very closely to Maxwell's own theories, though by no means as technical.

Cold logic was his keynote. Did science realize, he asked, that the slow disappearance of plant life—whether explainable or not—would mean the death of mankind not only from starvation, but from the lack of anything to absorb the continuous flow of carbon dioxide being perpetually breathed into the atmos-

phere? Since it was an inevitable fact that any living organism must die in its own waste, it was clear that humanity would start to die once the proportion of organic creatures overbalanced those of the inorganic.

This observation sent a stir through the scientists. It began to dawn on them with vivid clearness that something unknown *was* in their very midst. The only thing to do was to erect machinery at top speed for the absorption of carbon dioxide. It demanded money—an enormous supply of it—but the gathering threat of vanishing vegetation the world over forced governments into lending their aid. Accordingly, there sprouted in all directions gigantic editions of the carbon-dioxide machinery used aboard stratosphere planes and deep-sea bathyspheres. Mankind breathed more freely in consequence, blissfully confident that the trouble would soon blow over.

BUT it didn't. In mutual despair, Maxwell and Allan watched the slow but inevitable vanishment of whole continents of grass and trees. Central Africa, in the space of a month, became as bare as the Arabian Desert. The foliage of the British Isles, pride of the Britons, melted like mist before a hot sun. Without sound, without apparent movement, grass and trees were scalped clean from the earth; whole rivers of emptiness crawled night and day down the lofty timber-forested hills of Canada. The mystic disease left nothing behind it—not a single blade of grass, not a single root that could ever sprout again.

The finger of grim, mysterious tragedy stirred up the melting pot of frantic humans and sent them scurrying to all quarters of the earth, full of threats, demands and suggestions. Timbermen, lumberjacks, scientists, farmers and agriculturists scattered to the four quarters of the vegetation-disrobing world to study and ponder a wholly inexplicable problem.

In time the riddle became classified, very aptly, as "Racing Baldness." But there was nobody on earth that could keep up with it. Expert horticulturists, champion flower growers and botanists met in solemn conclave and discussed learnedly all the flower diseases they'd ever encountered or heard of. Such things as dry rot, double striping, wet streak and root warp filled the air of their meeting chambers. But the fact remained that when they had finished and passed several resolutions, their champion specimens—either vegetable or flower—had disappeared forever from their sight and knowledge.

The certain maddening inevitability of disappearing green stuff the world over completely upset man's delicately balanced emotions. An immense wave of panic and despair ruthlessly gripped every country; the foundations of everyday commerce were literally being cut away. Fortunes tottered and vanished overnight. Stocks and shares, wheat and corn markets became the rampage grounds for frantic, penniless investors. Ellerman K. Hicks, the corn cob king, shot himself in full view of thousands of harassed associates. With the action he started a world-wide epidemic of suicides.

Magnates whose fortunes relied basically on the world's staple food supplies eliminated themselves one after the other. Those of their staff who were left behind tried vainly to salve something from the wreckage. The Racing Baldness just went on, grew and grew, never disturbing anything, simply lifting away green stuff as though it were dissolving steam.

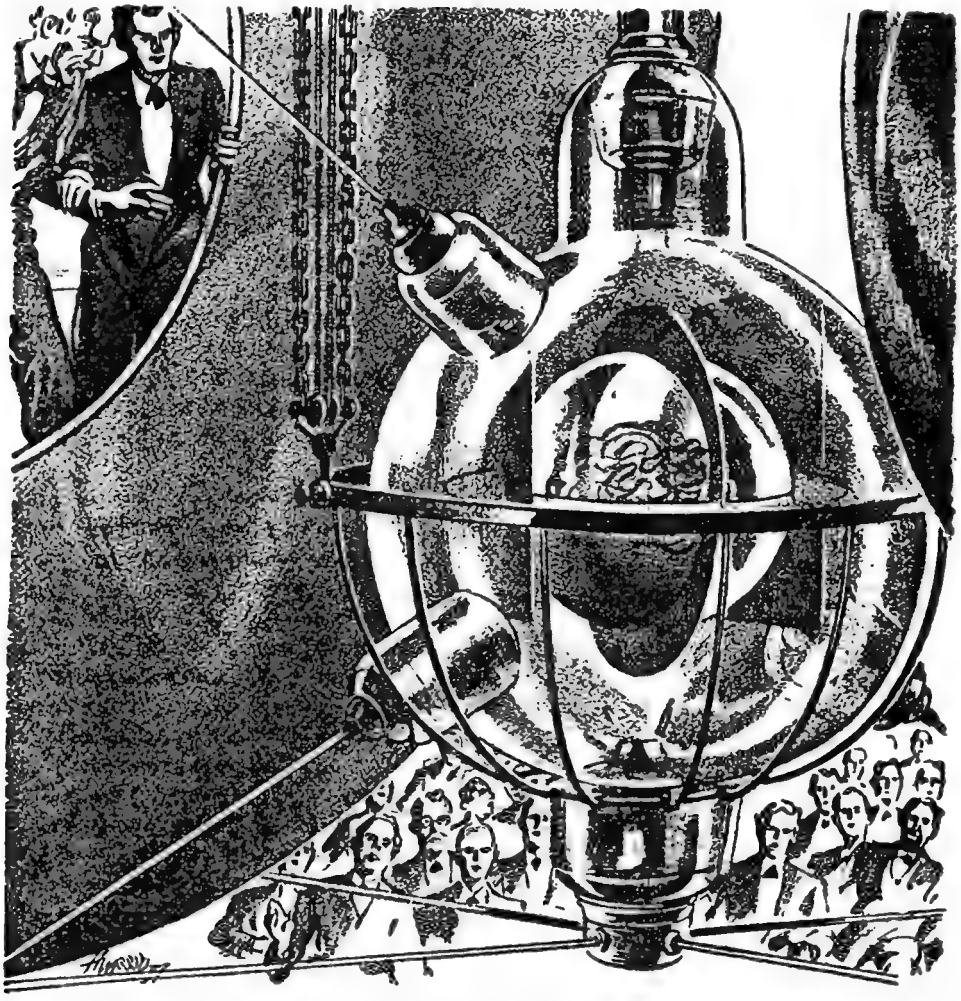
IN FOUR MONTHS the African and South American jungles had gone; in five, the immense redwood and sequoia forests of California had followed them; in eight months practically every country was empty of green. Grass, desert scrub, trees, vines, even sea kelp

and algae had all disappeared. For the first time in history the Sargasso Sea became easily navigable.

In a year there was a bald world. Throughout that entire year Maxwell and Allan had toiled mightily on the dead professor's notes, working every possible hour, sleeping and eating only when sheer necessity compelled it, aided now in their Herculean struggles by the best scientific minds the world had ever produced—but still the same unsurmountable riddles rose up.

Professor Dunn had been a phenomenon among men. He had devoted a supreme brain to one sole subject, mastered it so perfectly that other men, trained in other directions, could not immediately correlate the profundity of his conceptions. Time, too, was fast catching up. Soon there would not be a chance. The world was already in chaos, and that only marked the beginning.

By the time total baldness had arrived, when not a single blade of grass was



Even as they stood beside it they could feel a certain aura of compelling mental force radiating from it.

anywhere to be found, the news burst from various quarters that animalcule life was vanishing from ponds, lakes and rivers—snuffing out as mysteriously as the plants had done. Two drops of water extracted from a notably life-infested lake in Central America revealed the fact that not a trace of bacterial or microbic life was within it. The water had a purity beyond all belief.

Added to this fresh riddle was the increasing problem of caring for cattle. The supply of synthetic, nitrogenous materials could not last indefinitely. Besides, there were distinct evidences that these materials were in an unstable state, bordering on collapse and ultimate disappearance. When that happened, humanity would be in the grip of a famine already manifesting itself in outlying districts beyond the major cities.

Back in New York, Maxwell, Allan and the scientists considered the new problem of vanishing little life.

"It's working out just as I predicted," Maxwell said drearily. "The escaped mental energy is assimilating the least intelligent things in order of progression. First the plants went; then there occurred what we might call a mutational process; it moved up to the absorption of the next highest mental state and is resolving it back into a primal state. That embraces the whole range of little things—microbes, amoebæ, bacteria, the living mites inside our own blood streams—everything! It is the total end of all humanity, of the world—maybe of the universe!"

How true his statement was became vividly revealed in the speeding weeks. Mankind, milling helplessly and uselessly to all quarters of the world, learned of the slow evaporation of little life from earth's face. Then the first stages of the disaster struck home to them, personally, as their own blood streams and lymph were affected. The effect did not entirely kill them, but produced a violent form of pernicious anemia—left them scraggy, weary, cadaverous of face, bloodless of skin. Utter blight had drained health forever from every men, woman and child on the earth.

ANIMALS were likewise. Cattle began to die off at lightning speed. But presently the "disappearing" epidemic caught up with them and eradicated them completely before they had a chance to die.

Confused and bewildered, sick and weary in mind and body, humans tried to grasp what it was all about, and in the main they failed. The weakest began to die off from starvation and anemia. Here and there a few managed to keep going, but for all that humanity's numbers were sliced to three quarters, and then a half, as the depressing months sped onward.

Maxwell, Allan and the scientists scarcely looked human any longer. They were gaunt-faced, white-skinned, creases of exhaustion and strain carved deep into their faces. Their clothes were dirty, their hair unshorn and flowing. Maxwell's beard straggled half down his chest.

"There's nothing now can save us," was his hopeless pronouncement when they came to review the situation. "Little life and greenery have gone. Now the mutation—if we can call it such—embraces cattle. Next it will be us. The process is moving much faster than at the commencement. Everything—*everything*—is resolving back to primal nothingness. The carbon-dioxide machines are still functioning, I understand, but they can't last much longer. Men and women are dying at their posts from sheer starvation and illness——"

"And so shall this unsubstantial pageant fade and leave not a wrack behind," Allan murmured, slumped in his chair with his eyes half-closed. "I guess Goldsmith was a darn sight nearer the

truth than he ever reckoned when he made that statement."

None of the others answered him. Words were no longer worth using; they meant nothing. The free release of primal thought energy had laid the foundations of entire universal collapse.

The ever-advancing tide of disappearance increased tenfold as it progressed. It leaped from the annihilation of little things and animals to embrace human beings in an incredibly swift pace of time.

THE MAJORITY of people whom it first attacked were hardly aware of the fact. They were close to death anyway. Here and there a few of the hardier spirits were trailing uselessly into barren green-bare lands, unable to believe that Earth's mantle had gone and could never return. Then, soundlessly—out of the birdless, windless air—that unknown impalpable power swept in and engulfed them.

Nor was it long before it crept up on New York and evaporated the once teeming populace from that now stagnant metropolis. It eradicated humanity from the streets, the slums, the harbors, the pestilential spots—the million and one odd corners still left untouched even by the sweeping brush of the 21st century. It lifted the rich and the poor, man and woman and child, and left not a trace behind.

It silently caught up with the drowsing, weary scientists in Dunn's laboratory and misted them to each other's gaze before they could utter a word or raise a finger. But it was not, as Allan rapidly discovered, an entire oblivion. Evidently that atavism to a primal state had still a long way to go so far as the individual consciousness was concerned.

Certainly he was devoid of body, almost before he knew it—cut off from all human associations, lost forever to Maxwell and the other scientists, to all he had ever known or loved. But he was still able to penetrate the veil with the forces of his slowly retreating mentality, able to behold those last hours of earth as, disembodied, dissociated from what other minds there might be around him, he moved hither and thither at the mercy of unknown ethereal shiftings and patternings, following that incredible dëevolution back into the very womb of creation.

He became the impartial witness of astounding things—things that occasioned no emotions, for his body was no longer present to agitate or electrify his nerves. With every second he could feel his comprehension slipping—slipping—slipping, as mentality was more and more resolved into one great common oneness.

Empty New York was before him. Momentarily it was the New York of 2069 he had always known, with its rearing spires and towers of evenly splashed windows, hiding behind them offices and apartments of a race now forever lifted from the world. Beyond the major spires squatted the heavier bulks of many hotels—darkly unlighted from within—catching the glimmer of a sinking western sun on their summits.

The canyons of streets, the broad tree-empty squares, the silent upjutting fountain jets were the deserted, flawless patchwork of a huge metropolis at the end of a life well and truly lived—a mass of erections to the memory of humanity poised almost on the edge of the harbor. There were motionless ships, anchored and abandoned, some with flags still flapping with a forlorn dreariness in the soft western wind. Soundlessly the oily waters slapped beneath their bows.

A TOY CITY crouched on Manhattan Island—that was how it looked. Then, as the mind of Allan Dunn shifted toward it by an unknown, subetheral current, he saw the first evidences of a change—the first collapse occasioned by the final extinction of every form of lit-

tle life that had ever existed—a vast mutation of destruction finally and absolutely completed.

Momentarily it was born to him that there was a reason—beside that of the little things, the bacteria and the myriad animalcules—making up the very solidity of the ground itself. The mind of man had built New York, had built every known habitation on the Earth. But it only existed so long as man held it in mind. Now, with the rapid degression of multimillions of minds into a backward state, that conception was fading with the rapidity of a dream.

The mind of Allan Dunn perceived, dispassionately, all-inclusive. He saw the mighty towers fade or slide down into each other like creations of warm wax. Apparently solid masonry and stone merged and sluiced into each other with soundless unity. The windows became part of the surrounding stone and the stone became a crawling plasma that slumped down into a uniform, consistent level, filling streets that were only transiently present.

Buildings, streets and squares slipped into one fading conglomeration of unknown substance—flowed outward to the silent sea and yet vanished long before reaching it. Vaporized like fog and leaving behind a virgin purity of undisturbed soil, the harbor waters writhed strangely and the ships disappeared. The waters flowed gently inward over wooden pillars that also slid into the indefinable consistency of the unknowable and likewise ceased to be.

Far away the sun touched the calm western horizon.

Maybe the disappearance of the city took a few minutes, or it might have been centuries. The mind of Allan Dunn, now so far retrograded, had almost lost cognizance of time. He only knew that man's withdrawn conception had also withdrawn the city of his creation, even as an awakening destroys the seemingly solid fabric of a dream. And since light, atmosphere and earth itself are but figments, he beheld, also, their slow dissolution.

He seemed to recede in space as he beheld it, or else it was the earth itself which shrank. He could not be sure——

V.

WATER AND LAND flowed toward a certain inevitable union. The land submerged; the mountains and hills leveled themselves to join the plains; the plains slipped below the sliding, inexorable tides. Every upraised level of land, every sign of a gorge or chasm ceased to be and sank smoothly to flatness. The waters rolled on. But they, too, eddied strangely and began to become transparent, shuddered and began to melt in fast-spreading patches of nothingness. Atmosphere, water, the very form and shape of earth were disappearing into a soundless eternity of void.

Within seeming moments earth had gone. The void remained, star-ridden, endless, sunless—for the sun, too, had gone with the earth. There was no moon, nor anything that had ever been visible from earth. Mars, Venus, Mercury—the giant outer planets—had snuffed out and left the endless dark. Constellations shifted and winked, became formations that had existed at some preceding point of time.

The mind of Allan Dunn drifted, onward and ever backward, toward the remote primary of all things. With that drifting, he realized the vague truth that he had been born before—that earth had not been his only world of existence. He had lived and breathed and struggled on other worlds, in other states in other bodies, in other times—frontiers of the utterly forgotten were laid bare to him as he devolved back to the state whence he had come.

The starlighted eternity gave place at

intervals to the fleeting, phantomic concepts of other worlds, populated by beings with whom he felt a certain kinship, whose secrets he had mastered, whose science was something incredible in its superlative efficiency. Then the knowledge had gone; he fitted miraculously into a world as fair as earth had been. He loved and died there—a being of no importance, but fitted none the less with sensations, hopes and ideals.

That, too, went—gave way to the void again, left him with the fading conviction that mind and matter, while undoubtedly differently evolved products of the same thing, could spread themselves over a variety of ramifications, just as matter can divide itself in a lowly form and produce millions from one cell. How otherwise, in this backward transit, could he account for the fact that parts of his complete mind had been scattered promiscuously throughout the universe—that in some places he had been transcendentally clever, in others as nonintelligent as an imbecile?

Now, on the retreating trail, he embraced all these mental forms, drew together the threads of his one unity, even as a backwardly growing plant might encompass the myriad grown plants spawned from its original seed—each of them apparently living an independent existence at the same instant of time.

Then the comprehension was gone. He could no longer conceive its potent meaning.

HIS MIND swept back over formless corridors of untold epochs and millenia of time—encompassing the shadowy, the vital, the meaningless, the incredible. Ghosts of a myriad strange lives and minds flowed together as one mental unit and passed through his receding mind without meaning. Ephemeral glimpses of worlds of vapor, cold, heat and pure energy passed him by and meant nothing.

The cosmos shifted again. He was a gyrating, backwardly hurtling point in a contracting universe. He slipped over a thousand million years into backwardness as though it were but an instant. Time, speed, distance and dimensions had ceased to register. He no longer knew methods of comparison, only knew the things that were. He snatched at and lost the flashing, practical evidences of proof that might have helped him.

Helplessly dissociated, yet with the dim conviction of drawing into a contracted oneness with other widespread arms of his mind, he contracted further and further toward the unknown beginning of time. Earth? New York? They were things that had no meaning, that had never been, that never would be, except as remote postulations of an expanding thought. He was contracting toward the beginning, not expanding toward finality, therefore such postulations were without shape or meaning.

Still the variety of lives slipped past his consciousness. He lived inside the stars, trod their incredibly heavy black surfaces, looked out from unknown outposts upon glassy seas that mirrored those same stars with a certain irresistible meaning. He moved through the interstices of solid matter; he existed in a deep ocean under inconceivable pressures.

Abruptly he was in three places at once, conscious of three distinct entities moving uniformly along one time track. The conception shifted—he was four-dimensional, extending into unknown space wherein no matter was closed.

THEN again the aloneness, the growing weariness, the dreary emptiness of isolated movement. His conceptions weakened. He rose less high in the scale of intelligence. He remained in a rut of small conceiving that encompassed only the lowly intellect of an animal. The same incredible variety was there. He was an animal in every shape

and possibility, sometimes a mere postulation along a line that never reached finity, at others a slowly moving squid in the deeps of an ocean, or a clumsy-footed beast on an unknown plain, caring for nothing save his immediate needs.

Sometimes he was hunted; at others he was the hunter. He lived and died. He died and lived—in a different species. He had his abode high up on a storm-bound cliff; he fought for his mate against a sky line that sprouted trees of no conceivable shape or meaning—figments, flashes, snapshots, momentary glimpses out of the vast evolution of mind and matter from its primal state.

Then suddenly he was fighting for his life in the blood stream of an unknown animal. He knew only life and death and food—a swift parasitical existence that faded as quickly into a stationary form wherein he had branches and drooped with forlorn abandon on the shore of a steaming ocean.

The shuttling visions faded. He was back in an infinity that was sparse with stars—stars that winked and trembled and faded one by one. Around him, about him on every hand he could feel a gathering oppression—mental oppression, enormous and crushing, the forcing together of a myriad mental states into their primal formation.

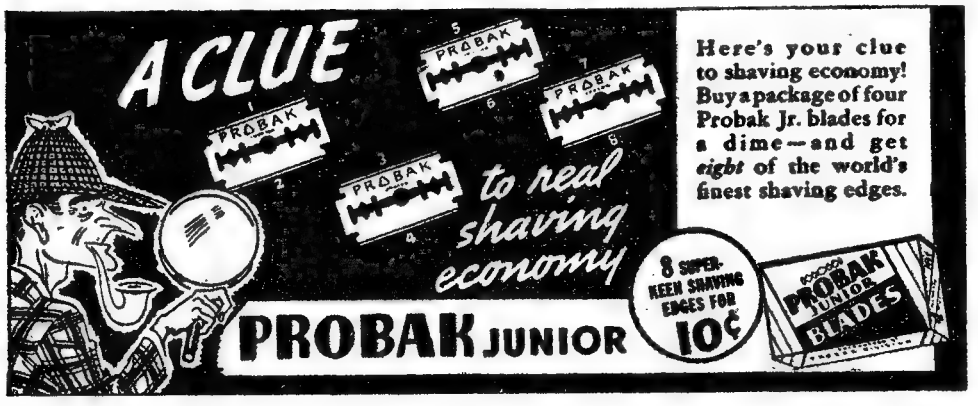
Distant hazy islands of light came scudding soundlessly toward him—the enormous masses of cosmic energy that had been hurled apart at the birth of the universe, at the rupture of the primordial atom of space, time, matter and mind.

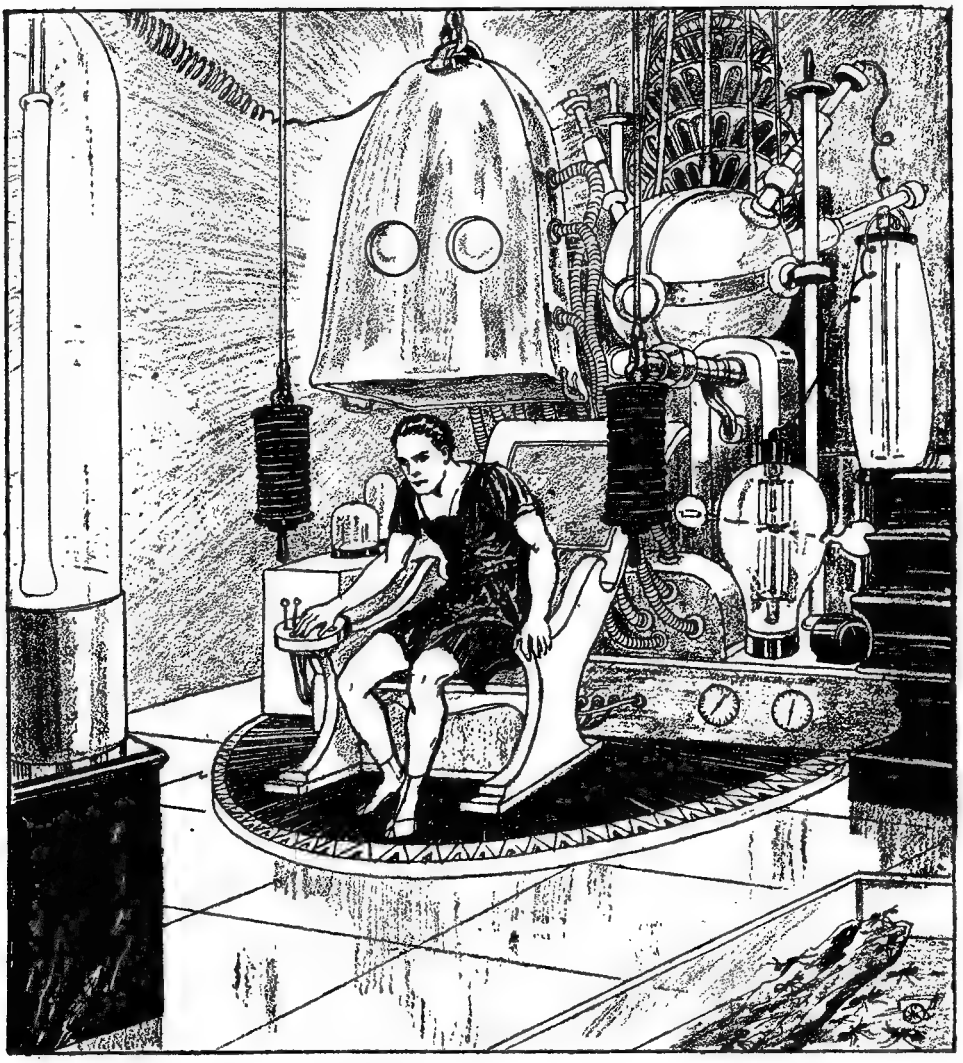
The pull of opposing radiations, the reason for cosmic birth, was momentarily strong upon him, outweighed only by that ghastly sense of ever-increasing mental pressure—a gigantic squeezing, the stresses and strains of a primordial atom returning to its primal state.

The distant nebulæ swept incredibly nearer, inward—inward—ever inward. The stars winked in their solitary positions and were not. Infinity was swallowing up in a soundless dark. Faster moved the nebulæ, crushing inward——

The strain was beyond endurance. Twin radiations fused across each other, in reverse, produced an unimaginable impact out of which had been all that was—mind and matter, matter and mind.

But the conscious mind of Allan Dunn knew it not. His mind, every mind included in his own, had flowed together into the one primal state, literally been undisrupted and hurled over the barrier that had brought it into being. Beyond that state there lay nothing—only the formless and the dark, an emptiness that was devoid of radiation, of ether, of matter, of intelligence; a fixed and eternal unity of pure space in which no thing was present, in which no thing would ever be present, except the dark—the everlasting dark——





MANA

All men had died—of intellectual satisfaction—exhaustion of curiosity—except——

by Eric Frank Russell

LAZY WATERS lapped and gurgled across the silver sands. An orange sun crawled high in the heavens, poured its rays through this atmosphere, and etched the higher portion of the beach with a delicate dado of shadow palms.

Omega, the last man on earth, stood naked in the coolness beneath a feathered frond.

He sighed, turned, and strode lithely into a paradise of plants.

Six thousand years, the long, extended years of the final era, had passed over Omega's head. But he was not old as beasts and plants grow old. His age was purely mental, and represented the measure of his satiation.

His body remained young, would always be young. Thousands had died within the sixty centuries of his memory, but he could recall none who had succumbed with physical decay. Men had expired with intellectual satisfaction, the exhausting of curiosity, the desire for mental rest—even as some of the esoteric ones of primeval days had willed their passing because they had lost the urge to live.

Omega was the last, solely because he was not yet satisfied. There was one thing still to be done—if it could be done.

He had lived through and tasted every experience within reach of mankind. He had even exercised his monofecundity and produced a child. But his son refused further issue, lived fast, learned fast and soon was satisfied.

Thus the flesh of his flesh, with the companions of his past, had slipped away like figments of a summer's dream. Men of the latter day knew the difference between what there was to learn and what it was possible to learn. Even human ingenuity could not encompass the entire cosmos. So each had quaffed his little cup and crept away to sleep. He, Omega, the unsatisfied one, lived on, determined to do that which had been declared impossible.

HIS FEET sped swiftly up a wooded slope; he mounted the crest and saw the towers and minarets of Ultima gleaming through a golden haze that lay along the valley. Exercise had tired his muscles; he called upon will power molded by a million years of evolution; his body rose into the air, floated over the treetops and across the valley. He landed lightly upon a marble battlement.

Calf muscles ached their protest against his fondness for walking. Omega rubbed them into submission, sat and rested a while, then stepped off the battlement and floated to the silent boulevard beneath.

Eerily, like the central figure of an allegorical picture, his form drifted across the dusty, unmarked highway, his feet swinging restfully twenty inches above the surface.

No other forms were levitated, and none walked through the peaceful avenues of that once-mighty city. Silent spires spiked to the azure vault above. Idle battlement reproduced the sky line of ancient Tintagel. Flying buttresses arched boldly to walls that knew no secrets to conceal.

Omega moved toward a dull metal door set in the opposite wall.

The door opened. Omega floated through it, along a corridor and into his laboratory. His feet felt the cold kiss of stone; he stepped to a glass-topped case and peered into it with eyes that shone as brightly as eyes that found the world still new.

"Mana," he murmured. His voice sighed softly, like the wind that quivers in the reeds along the water's marge. *"Mana."* He often talked to himself. The habit was his only concession to loneliness. He pressed a stud that caused a dull, warm glow to spread through the interior of the case.

"Nothing, they said, could perpetuate mankind forever," he proclaimed. "Nothing.

"Nothing that man could make, or produce, or build, or give, could endure as long as Nature endures. The valleys shall be raised, and the hills shall be made low. All that humanity has made, all that humanity can leave, shall crumble into the dust; and the empire that once was, and soon is not, shall be given over to the birds of the air, the

beasts of the field, the trees, the shrubs, and the creeping growths."

His fingers rapped on the case; he noted resulting movements below the glass.

"Patience," he told himself. "The thousandth failure may but precede the first success."

EAGERLY he strode to a complicated chair that stood with tilted back against a maze of instruments. Suspended above the seat by simple counterweights was a great metal hood.

"It must be photons," declared Omega, standing before the chair. "A thousand experiments have shown that either cosmic rays or photons perform the function of carriers of *mana*. And I still maintain that it cannot be cosmic rays. If it were, there could be no *mana* upon the ozone-wrapped Perdel, in Alpha Centauri."

Seating himself in the chair, he continued to reason.

"Therefore, by simple elimination, it must be photons. And upon this planet only we bipeds were really susceptible to their natural intensity, other life being less affected. But if I can increase the strength, passing an abnormal load along a beam of photons, a positive reaction should be hereditary. It would, I think, be handed from generation to generation, and——"

His lips snapped shut; he raised an arm and pulled down the hood until it covered his head completely. A contact on the arm rest closed beneath his firm fingers, and the apparatus woke to life.

There was no noise, nothing to indicate action save a swift turn and steady trembling of needles within three dials, and a mighty, angling leap of a concentrated beam of cold light.

Omega sat limply, the machine behind him driving a double cone of psychowaves through the back of his head. The cones narrowed through his brain, emerged from his eyes, passed through lenses set in the front of the hood, and entered the wave trap that gleamed mirrorlike at the base of the light transmission tube. In effect, the trap was the focal point of Omega's mind.

The beam of cold light was a thin column of intense brilliance as it poured up the tube, angled across to the case, and again angled into the interior. The glow from the case was vanquished by the new and mightier illumination.

For fifteen minutes the last man sat half concealed beneath the metal sheath. Then his damp fingers opened the contact; his hand raised the hood and exposed a face strained with fatigue.

He crossed to the case, stared through its glass top.

"Mechanistic behaviorism may serve as a crutch—but never as a ladder," he told the unheedful subjects of his experiment.

A small heap of rotten wood lay in one corner of the case. In the center, between two highways swarming with pedestrians, stood a midget box mounted upon microscopic wheels. Near it rested a Lilliputian bow with a bundle of tiny arrows.

Raising the lid of the case, Omega inserted a hand, and moved the little cart with a touch of slender fingers. Delicately, he shot an arrow from the miniature bow, and saw ants scuttle in all directions. Patiently, he rubbed two shreds of wood into flame, and let them burn at a safe distance from the rest of the heap.

"I feel one degree more stupid after each attempt. The light must be transporting it somewhere."

He watched the agitated ants as he stood and mused a while. Then he sighed, closed the lid, and floated from the room.

TIMELESS DAY and immeasurable night upon a world that rolled in sluggish mourning for glories long departed.

Omega stood upon a battlement and turned his face to the fiery ring that split the midnight sky from horizon to horizon. Incredibly ancient scrawlings upon records long since perished had described the beauty of the satellite from which this ring was born. Omega doubted whether the serene loveliness of the Moon had exceeded the glory of its remnants.

The light of the lees of Luna served to reveal the triumph upon the face of the last man, and the case of ants clasped firmly in his arms. With a frown for his sensation of mental weakness, but a contrasting smile upon his lips, he stepped off the battlement and glided like a phantom above the leafy cohorts that pressed eagerly upon the marble outskirts of Ultima. His figure floated onward, far above the treetops where wooden arms were raised in worship of the ring.

Over a tiny glade he ceased his forward progress, wavered in the slight, cool breeze, descended slowly, and felt his feet sink into a dewy cushion of earth. He placed the case upon the grass, opened its lid, tilted it, and watched the ants depart.

Satisfaction shone upon his features while he studied a group of insects laboriously urging out the midget cart. They pushed, and pulled, twisted its wheels this way and that, and finally trundled it into the secret paths of the grassy jungle. He watched it disappear with its load of splinters of rotten wood, the bow and arrows resting on top. He stretched his form, and raised a glowing face to the heavens.

"When the first hairy biped rode the waters on a log, that was *mana,*" he proclaimed. "When fire was found, and made, and used, that was *mana.* Whenever men struggled one step higher up the ladder of life, it was *mana.*" He swung an arm in a sweep embracing the entire cosmos. "Even as it was given to us by those whom we could never know, I give it to those who can never know men. I give it as our everlasting monument."

His nerves grew taut as he summoned his weakened will. He floated upward, faster, faster, toward the elegiac ring. He was bound for space, where eternal sleep came easily and was undisturbed. There were no regrets within his soul, and he uttered no farewell. He cast one glance downward at aimless billows surging on a printless shore. His eyes passed thence to the woodland glade, caught the first flicker of a tiny fire, and he was satisfied.

Omega, the last man, had presented the ants with fire, the wheel and the bow. But, best of all, he had given them what both the first man and the last had called *mana—intelligence.*



MASTER MIND

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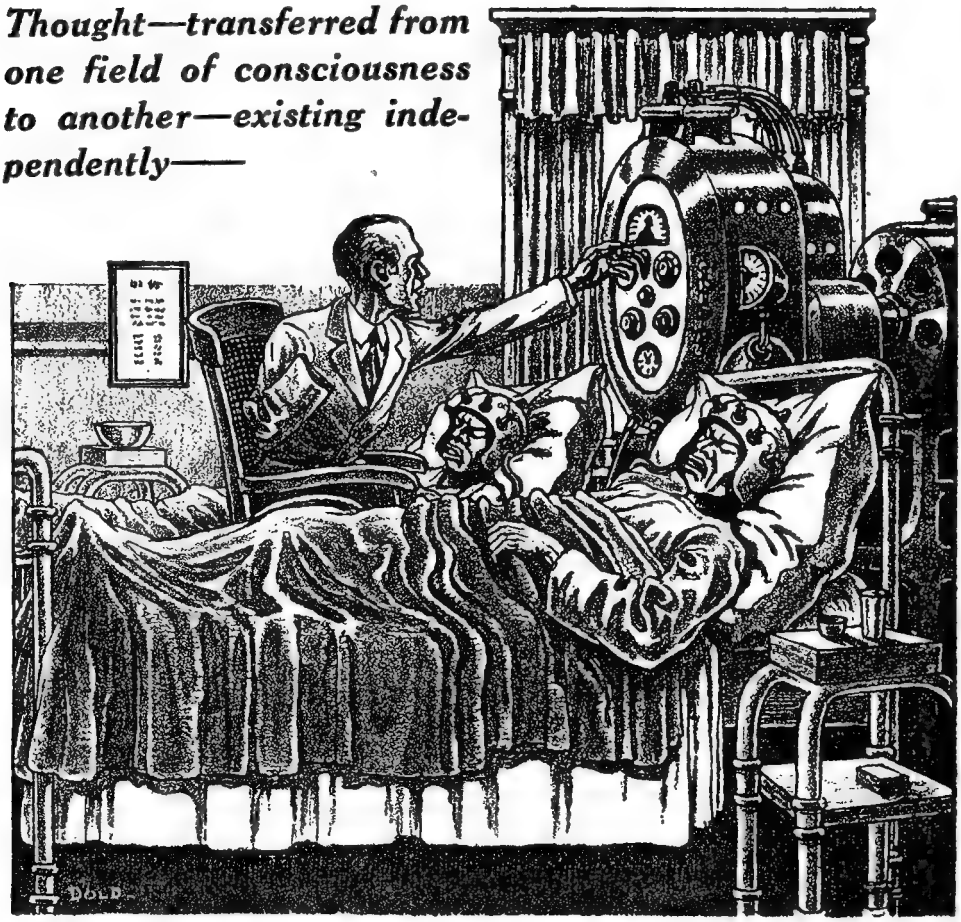


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The Mind Master

by Amelia Reynolds Long

Thought—transferred from one field of consciousness to another—existing independently——



If the thing could be done, he would commandeer a new, strong body——

DR. GRENFEL looked at the bandaged stump that was all that remained of his right arm, then down at the blanket that covered his legs. They had managed to save his life after that plane crash, yes; but at what cost! They had left him a one-armed, helpless cripple, paralyzed from his waist down. Of what use to a doctor was a body such as this? It would have been better if they had let him die.

"But you still have your mind surgery, doctor," young Giles, his assistant, had reminded him optimistically. "You can diagnose, and direct others in the use of your wonderful machine."

Yes, he reflected, he still had that. But to have to sit helpless in his chair

while another had the thrill of experimenting with the new mind machine, his remarkable new invention that, through electrical stimulation, was to restore men's lost memories, blot out the brain cells harboring criminal impulses; in short, that could mold the human mind as he, Norman Grenfel, saw fit. Yet what hideous irony that his own mind, with all its brilliance, should be chained to this mutilated hulk of flesh!

But was it? Long ago he had begun to suspect that the psychologists were wrong, and that mind was not a mere by-product of behavior. The first hint had come to him through his experiments with mental telepathy. If thought could be transferred from one field of consciousness to another, then it must be something that existed independently of matter—a kind of electrical impulse, that used the brain merely as a medium for its expression. It had been upon that principle that he had built his mind machine.

He hugged the idea to him now. He had already discovered the length and frequency of the thought wave; that had been necessary for the operation of his machine. But why, instead of using it merely to control the mental operations within a single brain, could the process not be applied to *two* brains simultaneously? Why could the mind current not be made to flow from one brain to another, much as it did in the temporary process of telepathy? Of course, the mind current already occupying the second brain would have to be forced out and lost; but that did not matter to Grenfel. If the thing could be done, he need no longer be a slave to this battered carcass of his. He could commandeer a new, strong body——

He played with the idea, examining it from all angles. It would necessitate certain changes in his machine, but they were elementary. He began to practice writing with his left hand, until at last he was able to draw up the necessary specifications. Giles could have the new parts made, and attach them for him. It was going to be comparatively easy.

He naturally did not take Giles into his confidence, but explained that the new attachment was a device by which a doctor could study his patient's brain, as he now studied the heart with a stethoscope. The tiny electric current generated within the brain of the patient would be amplified and translated into sound through a headpiece worn by the examiner. Giles accepted the explanation without question, and when the new parts were made, he attached them to the machine under his superior's direction.

Grenfel watched the young man as he worked. His eyes rested upon the sure, capable hands, the broad, intelligent forehead. Here was a strong, well-made body. He began to formulate the final part of his plan.

But first the machine would have to be tested, to make sure that it did correctly the thing for which it had been designed. Grenfel cast about for two subjects for experiment, and found them almost at once.

In the hospital's charity ward for hopeless mental cases were two patients that were little better than Mongolian idiots, revolting caricatures of humanity without even the intelligence of a wild animal. If the machine failed to work, the deaths of this pair would be no loss. Besides, they would die soon anyway; this type never lived long after attaining the adult stage. He had them removed to the top floor, where his private laboratory was, "for special observation."

He waited until an hour when he could be sure of no interruptions, then he wheeled himself into the space between their two beds. The machine had already been placed there, at his direction, by Giles.

With his one arm, he laboriously ad-

justed the metal caps to the misshapen heads. Then he paused for a final study of his two human guinea pigs. Although neither of them was capable of demonstrating intelligent behavior, each had certain characteristics that differentiated him from the other. The one on his left, for example, had a habit of continually plucking at the bedclothes. It was upon insignificant trifles like this that Grenfel was depending to tell him whether his experiment had worked or not.

With fingers that insisted upon trembling, in spite of all that he could do, Grenfel pushed over the switch. The motor of the machine began to hum, softly at first, then more loudly as he increased the power. The two bodies upon the beds jerked spasmodically, and stiffened into immobility. Grenfel waited until three minutes had been ticked off by the clock. Then, slowly, he began to decrease the power. The bodies relaxed again.

Grenfel passed the tip of his tongue over his dry lips. He kept swaying his head from side to side, trying to observe both figures at once. Suddenly, a hoarse cry of triumph burst from him: the patient *on his right* had begun to pluck at the bedclothes!

Feverishly, he turned to the mindless thing on his left. It was not moving. Even the chest appeared to be still. Grenfel caught one of the thick wrists between his trembling fingers, and felt for the pulse. Then he swore softly. The fool had chosen that moment to die.

IN THE WEEKS that followed, Grenfel studied young Giles closely, memorizing his every mannerism. If the second part of his plan was to be carried out successfully, there was a great deal that he would have to know in order to escape detection. Under the guise of friendly interest, he questioned his assistant about his outside life, until there was nothing of importance concerning the young man with which he was not familiar.

One day, when he and Giles were alone together, Grenfel broached a subject that was to be significant later. "Boy," he said, simulating a kindly smile, "you have been invaluable to me during these past six months. You have been my hands and feet."

Giles, who always became embarrassed upon occasions like this, muttered something about considering it a rare privilege to be permitted to work with a man like Grenfel.

"And it may not be long," Grenfel added, watching the other covertly, to study the effect of his words, "before I may have to ask even more of you. I may have to ask you to be my brain as well."

"Your brain?" Giles repeated in blank astonishment. "What do you mean, doctor?"

"Ever since my accident," the older man went on, "I have been experiencing strange, mental blanks. They are more than brief attacks of amnesia; they are passages of time of which I have absolutely no recollection. Lately they have been increasing."

"Why didn't you tell me long ago?" Giles exclaimed. "With your machine you——"

But Grenfel shook his head. "I doubt if the machine will help in my case," he said gloomily. "I suspect that through some head injury, which my colleagues here at the hospital did not discover, cerebral disintegration has set in. As you are aware, there is no cure for that. Therefore, I have arranged with my lawyer that, in the case of my losing my mind or of anything else befalling me, all of my personal property, including my notes and the patent on my machine, be turned over to you. I will expect you to carry on my work."

Giles could only stammer out his

mixed emotions. He was thrilled and delighted by the honor that Grenfel's action had bestowed upon him, but he sincerely hoped that the time would be far away when he should reap the benefits of it. Meanwhile, Dr. Grenfel must let him perform an examination with the new attachment to the mind machine. Perhaps something could still be done.

Grenfel smiled inwardly. The young fool had fallen for it all, and had even suggested himself that they use the mind machine. That would make matters a lot easier.

HE WAITED a few more weeks, just to make everything appear more natural. He even pretended on one or two occasions not to recognize Giles when he came into the laboratory, knowing that the young man would carry the story of his approaching breakdown to the other doctors on the hospital staff. The build-up for his "mental collapse" must be complete.

At last he again brought up the subject of the machine. "Giles," he began, "you have seen for yourself that I am rapidly slipping. I have no illusions about there being any likelihood of a cure for me, but I want you to give me a thorough examination with the machine. I've got to know how long it will be before——" He broke off with a gesture meant to be a blend of pathos and resignation.

"Of course I'll examine you, doctor!" Giles exclaimed eagerly. "But don't give up hope so easily. Things may not be so bad as you imagine."

Grenfel smiled tolerantly. "The optimism of youth!" He sighed. "Well, we shall see.

"Perhaps," he added as an afterthought, "you had better ask Dr. Green to be present. We may want him for consultation." Best to have a disinterested witness present at that all-important moment.

Giles nodded. "When do you want the examination to take place?" he asked.

"This afternoon, if Dr. Green is at liberty."

During the intervening hours, Grenfel went carefully over his machine. Then he set the automatic controls gradually to increase the power, to run steadily for three minutes, and gradually to decrease again. All that was necessary now was to throw the control switch on and off. He smiled with ironic amusement as he realized that he would do the first as Norman Grenfel, and the second as Henry Giles. He had barely completed his final adjustment when his young assistant arrived, accompanied by Dr. Green.

"I have already explained the working of the new apparatus to Giles," Grenfel said to Green. "I will place this metal cap upon my head, and he will place this one upon his. When the current is turned on, he will receive an amplification of my mental vibrations over the connecting wire. Should a break in the current occur, it will indicate the presence of a brain lesion."

"I understand," Dr. Green said, and honestly thought that he did.

Grenfel placed upon his head the light metal cap with its eleven electrodes, ten for the major convolutions of the cerebrum of the brain, and one for the cerebellum. Giles did likewise.

Grenfel reached out his hand toward the switch, then paused to remark to Green, "You know, doctor, this examination is more Giles' idea than mine. He is convinced that I may not be so badly off as I imagine. But in any case, I have arranged matters so that, whatever happens to me, he is to take my place and carry on my work."

He threw over the switch.

He felt his crippled body jerk convulsively, as the gradually increasing current raced through his brain. It was

as though his very ego was being ripped out and carried along that little strand of wire. Then unconsciousness descended——

WHEN he came to, he felt weak and ill, like a man who has been under a severe physical and mental strain. Something was buzzing in his head, like a swarm of bees. It sent a tingling sensation all through him.

There was something he had to do, something connected with the bees and the tingling sensation. Now he remembered. He must throw off a switch on the machine over there.

He rose unsteadily upon trembling legs, fumbled awkwardly with the mechanism, and at last succeeded in cutting off the current. As the buzzing and tingling stopped, he found that he was able to think more clearly.

Then he realized that he had *walked* to the machine, while the hand with which he had thrown the switch had been his *right* hand! And that twisted, maimed body slumped there in the wheel chair, above which Dr. Green was now bending——

A shout of exultation bubbled to his lips. "I've done it!" he cried, hysterical with the realization of success. "It worked!"

Dr. Green turned from the motionless figure in the wheel chair. There was horror in his eyes, horror and indignation.

"Yes, you young blackguard!" he rasped. "You've done it! You couldn't wait for him to die naturally to get his money and position. You had to murder your benefactor! I saw you electrocute him just now with his own machine!"

In a daze, Grenfel felt himself being led away by blue-coated policemen. Then a bright light was in his eyes, and men with big fists and hard faces were screaming at him to confess—confess.

Confess to his own murder!

Only when he sat in the condemned cell, awaiting his execution, did Grenfel—now Giles—realize where his plan had slipped up: the ego, or mind force, was closely intertwined with the life of the physical body. In tearing out the one, he had destroyed the other.

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(Advertisement)

Spectral Adventurers

A scientific article on the possibilities for the development of invisibility

THE CASEMENT swung open on noiseless hinges. A shadowy figure, hardly darker than the surrounding shadows, raised slowly and swung into the Stygian gloom of the room. He crouched inside the window, trying vainly to see the outlines of the bed he knew was in the farther corner. An outthrust hand felt slowly along the floor, seeking an open pathway to the sleeper.

But to the man in the bed the room was plainly visible. Not as we ordinarily think of visibility; but each object glowed with a metallic luster.

He saw the figure of the intruder crouched just inside the window, his face and hands glowing with lambent violet fire. The occupant of the bed raised his right hand, swinging into line two pin points of blue-and-yellow fire, lining them up against the violet temple of the night prowler.

"Drop that gun! You're covered!"

With a hoarse cry the man started to his feet, but sank back again with a choked scream. For out of nowhere there had appeared at each side of him glowing skeletons holding pistols extended toward him. His own heavy gun crashed to the floor, and at that instant the lights in the room flared up. The prowler caught a glimpse of a dull-gray screen just disappearing into the ceiling, and beyond that a bed in which a tousled young man sat grinning cheerfully, but not at all careless in the steadiness with which he held a gun upon his uninvited visitor.

The door burst open and two husky men appeared, sketchily dressed.

"Tie him up and send for the police!" And with that the young man sank back into his pillows and started to snore lustily.

THE AIR was heavy with the bouquet of rare vintages and the aroma of good tobacco. Men, obviously accustomed to the best in life, sat back and gave their attention to Cameron, who had just been introduced. These men, representing the best legal minds in the city, listened with growing interest.

Because Cameron was interrupted once or twice, and often digressed to explain a minor point, we shall not repeat his talk verbatim, but shall only give an edited transcript, omitting the direct quotation.

WE ENVY those men whose activities take them into the fastnesses of unexplored jungle or across broad arctic wastes; but we give little heed to those other adventurers whose feet tread in paths absolutely new to human feet. When we read of a hunter who has been mangled by a lion, we regard him as a hero; but when we read of a man who has laid down his life that mankind might extend his knowledge, we laugh and remark, "Another nut got his!"

I am not here to crusade for recognition of the scientist. He does not need a champion, for his work gives him glorious immortality. I merely wish to point out to you that here are men who, without the plaudits of the multitude, without the insane driving force of hysteria, venture ever deeper into the unknown jungle of scientific research.

by Herbert C. McKay



To him the room was plainly visible—not as we think of visibility—but each object glowed with a metallic luster——

True, most of the way is pleasant, but when death strikes, it takes its victim unaware, like a bomb dropping into a secluded fishing lake. So, gentlemen, these men who search unceasingly to reveal the secrets of the spectrum of life I have chosen to call the spectral adventurers.

It is true that in exploring the spectrum of electromagnetic radiation we explore the fountainhead of life itself. When its secrets are all laid bare we shall indeed be masters of life—and death. We already know that in some regions of the great spectrum lie the motivating forces of life, and we know

that in others there lies sure death. Gentlemen, the "death ray" is not a figment of the imagination; it has been twice discovered and twice the discoverers have buried the hellish secret for eternity.

So that you may more fully understand this, it is necessary that we clarify certain facts about the spectrum, later we shall examined more closely that minute portion of the great spectrum which we call the visible spectrum.

The great spectrum is the scale of electromagnetic radiation. We know but little of it. We assume that the range of radiation with which we are familiar is but a small portion of the scale which is truly the basis of the music of the spheres. However, we have investigated a sufficient number of bands within the spectrum to state that it is a diminishing but continuous range of vibration, starting with the long-wave radio waves, such as the 2,000-meter band, which are as great as one and one half miles long, yes even greater, and then running down the scale until we reach the cosmic rays, which are so small that we turn to mathematical expression to state their size. This size is about 10^{-10} centimeter or 1/10,000,000,000 of one centimeter, one ten billionth of one centimeter. Recall that it takes a thousand multiplied by a thousand to make a million; yet it would take roughtly *twenty-five thousand million* cosmic rays to cover the space of a single inch. This we express merely as 10^{-10} centimeter!

So much for size. All of these radiations have a velocity of some 187,000 miles per second or about 301,000,000 meters per second. This is often stated as being 186,000 miles, or 300,000,000 meters. Considering the vastness of the number and the fact that this is an informal talk, suppose we assume that 300,000,000 meters is the correct figure.

This means that in the case of ultra-short wave radio when we have wave lengths one meter long, three hundred million of these waves pass a given point in one second! In radio parlance we would call this three hundred megacycles.

The waves which give rise to visible light have a length of from about 0.4 to about 0.8 microns. The micron is one ten thousandth of a centimeter or 10^{-4} cm. Green, for example, is about a half micron in wave length, or 20,000 to the centimeter. This means 2,000,000 to the meter and at our accepted velocity of 300,000,000 meters per second, the eye is bombarded with 600,000,000,000,000, or six hundred million million impulses a second to produce the sensation we call "green."

These figures are becoming incomprehensible, so let us set up a chart which may enable us to get our feet somewhere on the ground. We shall go both up and down the scale from the centimeter.

Relative size.	Size equivalent to:	Characteristic wave length.
10^{18} cm.	Distance of nearest star	**
10^{15}x1.5	Distance of the sun	**
10^{10}x4	Distance of the moon	**
10^{9} x1.3	Diameter of the earth	**
10^{5}	One kilometer	Long-wave radio
10^{4}	Skyscraper	Radio
10^{3}	Width of street	Short-wave radio
10^{2}	One meter	Experimental radio
10^{1}	About four inches	Quasi-optical
10^{0}	One centimeter	
10^{-1}	One millimeter	
10^{-2}	Hair's breadth	Hertzian waves
10^{-4}	Bacteria	Infra-red
10^{-5} x5	****	Visible rays
10^{-5}	****	Ultra-violet
10^{-6}	Molecules	****
10^{-7}	Molecules	
10^{-8}	Atoms	X rays
10^{-9}	****	Gamma rays
10^{-10}	****	Cosmic rays
10^{-13}	Atomic nuclei	****

This table is not to be taken too literally, but for our purpose, that of orientation proportion we may get some of these dimensions into our mind. For

example, a bacterium compared to a centimeter is about like comparing the centimeter to an average skyscraper. If the skyscraper is ten thousand centimeters high it would take ten thousand bacteria to pile up to the height of a skyscraper model only 0.4 inch high!

The human mind cannot adequately comprehend the difference between the cosmic ray and infinity, just as there is no comprenhension of the difference between the distance of the more distant nebulæ and infinity. We merely accept these things as mathematical facts.

Now that our course is charted, we may as well hoist the sails of our argosy and start upon our spectral adventures.

You may be familiar with the mechanistic theory that all human perception partakes of the nature of electricity. I am not here to argue that fact, but we do know that all radiation with which we are familiar, from long-wave radio to cosmic rays, is merely the manifestation of an electromagnetic wave form. We also know that the one difference which exists between any two radiations is one of size and that only. It is a fact that human vision, human sight, is but a phenomenon of radio! Radio and sight are peculiarly analogous. Both may be tuned, filters are used with both to remove unwanted wave lengths; but, most striking of all, both are susceptible to that process of specific mixture which we call heterodyning.

It is known that if two different waves are mixed, we obtain two different wave lengths which we had not before. One is equal to the difference between the wave lengths and one is equal to the sum of the wave lengths!

When totally invisible ultra-violet light falls upon certain chemical substances, a mixture takes place and a visible wave is generated. This we call fluorescence. This visible light has a peculiar metallic luster. However, the phenomenon is more common than is supposed. I submit a theory for your consideration. We know that the ordinary photographic lens is opaque to the ultra-violet. We also know that fluorescent light is far less active photographically than its visual brightness would lead us to believe. We know that color photography has never yet reproduced true metallic lusters. May not that quality of color which we call "metallic" be caused by a phenomenon of heterodyning? I think that is the case.

To return to the radio analogy. The quality of radio reception depends largely upon the receiver used. Just so in the case of the eye. Standing side by side you and I recognize the same object, but it is impossible to believe that we both *see* the same scene. Gradually we are gathering evidence that if I could in some way become aware of your true mental perception I could not recognize an object as familiar as my own study room!

You, gentlemen, are accustomed to accepting life in the terms of your personal experience. We, who are engaged in scientific research, must perforce do our utmost to penetrate the secrets of human reactions without the coloring of that same individual experience. Just as the mechanic must know the secrets of your automobile engine, so we strive to know the mechanism of life.

You are more intelligent than the average; you are used to examining witnesses and plumbing the depths of obscurity of human reasoning—yet no one has ever succeeded in describing anything to you in any terms other than those of your own experience! You cannot imagine any object which is totally dissimilar to anything you have ever seen. Imagination can never carry you beyond the limitations of your own experience. How, for example, would you describe an automobile to a man who has lived his life at

the south pole and who never even saw a sledge? The best you could do would be to create an image by drawing or the use of a photograph, in which case you supply the missing experience!

It is the same in our adventure. I take this object from the table. You say it is an orange. You say that it is roughly spherical in shape, that its color is a reddish yellow which we have called "orange," after the object itself. You say the skin is rough. You all describe the object in the same verbal terms—yet no one knows better than you that to a dozen different people the same terms convey a dozen different meanings. If this were not true most of you would have to seek other occupation.

Let me cite an example to explain my next statement. Suppose one of you had been born with a neurosis which made objects appear longer in the horizontal than in the vertical dimension. A circle would appear in your mind as an ellipse, or as you would say, an oval.

Such an aberration would be easily discovered you say. But how? A circle is the shape described by a compass, with all of its parts equally distant from the center. You apply compasses and they follow the oval outline. You measure the radii and they all measure the same. You accept as fundamental that lengthening of the ruler as its position is changed. You have no reason to question it, no terms with which to describe to another your vision, because the terms you use would coincide with the experience of your companion and your perception would be substantiated. It is quite possible that one or more of you actually have this condition, but neither you or any one else can ever become aware of the fact!

When your mind first developed to the point where you gained color perception, you were shown such a fruit as this and told that the color is orange.

Is there any way in which we can be sure that your mental perception of orange is the same as mine? There is none!

For example, most people associate color with temperature. We are agreed for the most part that blue is cool and red is warm; but in the intermediates I have known people who insisted that green is a warm color, while to me both green and yellow are decidedly cool in tone.

Perhaps the sensation you were told was orange created a mental reaction which my mind would call pale-green. That which I recognize as rich green, might, in your mind, produce the sensation I call red. We can never know. All we know is that the mental sensation which is produced by blood is one we have been taught to call red. That which is produced by grass we have been taught to call green.

To make this more clear, I might rear a family upon a remote island. I teach my children that the scooplike table instrument is called a "shoe" and that the covering for the feet is known as a "spoon." It would be quite natural for that child to think that he eats with a shoe and wears spoons upon his feet.

You may laugh at the poor drunk who sees pink elephants, but if you could go to the zoo and establish psychic contact directly with the minds of the visitors there you would see monstrous, distorted elephants of every imaginable color and some of colors which you have never imagined!

Recent investigation has revealed that the monstrosities of so-called modern art arise in physical aberrations of the mechanism of sight; and *because of mental aberrations which cause the world to appear thus to the psychopathic artist.* He has, through some quirk of mentality, been able to put upon canvas the world as he conceives it!

Gentlemen, our perception of external

stimuli transmitted to our brains by the sensory nerves are unbelievably individualistic. As they are the primal factors of experience, we can receive no guidance in their development.

This actual mental reaction may not even be recognizable as a type. It is not entirely beyond the range of possibility that your sight is something my own brain would react to as sound, and what I call sound is smell to you. You say sound could not be so delicate as sight. Why not? The delicacy is due to the mechanical perfection of the eye and the way in which it reacts to the stimulus. The delicacy of sight is the delicacy of the visual mechanism. Again it is a case of wearing spoons upon the feet. The accuracy of the transmitted sensation depends upon the transmitting equipment. You can speak English, Italian, Punjabi or sing grand opera over a radio telephone and all will be transmitted equally well; but a string telephone would garble all of them.

It is only experience, repetition and the delicacy of the visual mechanism which makes sight the exact sensation it is.

You question these statements. You feel that I am wrong because all the people you know eat with spoons and wear shoes upon their feet—in other words because of identity of terms you assume identity of sensation. But then, how do you account for the individuals who rise to fame through the exercise of a hypersensitivity of some special sense; creators in the line of pictorialism, music, literature—persons for whose gift no accounting can be made on the basis of either heredity or environment?

I am not a musician. I do not play any instrument. Should I attempt to sing I would be alone in a few seconds. Yet, I am unusually sensitive to the slightest falsity in tone. A slight sharpness or flatness of tone causes a distinct sense of physical discomfort to me. Other individuals of equal and greater intelligence are totally unaware of errors of a full half tone. If their mental response to sound were identical to my own, why should they not experience the same physical discomfort? It is not a matter of the physical ear, for some of these people have an acuity of hearing which far surpasses my own. Our mental imagery cannot be identical.

During the early days of my own spectral adventuring, my work in sound recording took me into the realm of sound. Now we know that sound is a wave form of air—a compression effect in a physical medium, and so it is outside our spectrum. But it does affect a special sense which is interpreted in the same mechanical manner as the other special senses. I found that while many people ceased to hear, I could still perceive a shrill, sweet tone. I was sensitive to higher audible frequencies than some of my co-workers.

When I had progressed to the field of visual radiation it seemed to me that the same thing might hold true. For several months I used my guests as guinea pigs; so much so that for a time I was shunned like a plaque. With a sensitive spectrometer I tested each of these friends repeatedly. The result was that some could see red where others could see nothing, and others could see violet where still others saw nothing. The result was what I had expected: some people see farther into the infra-red than others; some see farther into the ultra-violet than others. There is no line of demarcation between the visible and invisible radiations. However, the experiment caused me to find one man who kept seeing right up into the ultra-violet. He was tested with an ultra-violet spectrometer. Placing a sheet of paper upon a plane glass he marked the locations of the ultra-violet lines well up toward the three thousand line, or almost a thou-

sand wave lengths beyond average visibility. When a florescent glass was placed in the instrument, his marks were found to be accurate. His vision was not plain in this region, but he could and did locate the lines.

By now you may be able and willing to accept the fundamental basis of all investigations in the realm of radiation. There is no light, no sight, no vision outside the human mind—and I distinguish between brain and mind. Sight in all of its manifestations has no true existence. It is a specter without physical existence. It is just as intangible as any of our thoughts, for it is nothing but a thought! The entire visual mechanism is nothing but an extremely highly developed radio direction finder broadly tuned! There is no more real vision than there are pictures in the air which are caught and held by the televisor.

You are familiar with radio. You say there is music in the air, but you know there is not. There is only an electromagnetic field which is vibrating at a certain frequency. When the aerial of the radio picks up these vibrations they are magnified by the receiver. The wanted ones are tuned out from the rest and again magnified. Finally, they are shot through a magnet. This magnet drags at the diaphragm of the speaker and we hear music.

Gentlemen, there is no music, no sound until that speaker diaphragm starts to move and beat against the air. It is true that the stimulus is picked up by the receiver, but this stimulus merely puts the mechanism into operation. When we get it to the magnet we can utilize that to operate a diaphragm to produce sound; we can use it to operate a cutting chisel to make a sound record. Gentlemen, we can shoot that into an intermittent light and make a photographic record which can again be translated into sound.

If the radio impulses can be interpreted in so many ways, according to the receiving device you choose to use, what about the receiver in our minds?

The eye receives the impulses and transmits them to the brain. They stimulate the brain and we feel a mental response. But you may have a chisel or a film recorder in your brain while I have a loud-speaker or ear-phones. In any case we all receive intelligible messages—whether we call them shoes or spoons.

By sheer coincidence we have found that there are certain chemical reactions produced by the same radiation which affects our eyes. Notable among these is the photographic reaction; but we must remember that there is no scientific relation between sight as a mental reaction and making a photograph, which is purely a chemical reaction. We may use one piece of ice to chill a drink and another to throw at a stray dog who is robbing the picnic basket. The weight of the ice as a missile has no part in cooling the drink, nor has its low temperature any effect upon its value as a missile.

It happens that the radiation which causes the sensation we call "violet" has the power to reduce certain atoms of silver bromide within the crystal. These reduced atoms act as nuclei so that a reducing solution will cause the process to proceed. Human ingenuity extended the response of the bromide to all useful radiation, even into the infra-red; but because there is no true relation between photography and vision, the photograph is so false that it is not recognizable to primitive people!

Moreover we find that radiations pass through some substances and are blocked by others. When the radiation is visible we call the one class transparent and the other opaque. We find that rubber, asbestos and similar substances are opaque to the infra-red, while metals are transparent to it. Moreover, we find that there is a recognizable relationship between electric

insulators and infra-red opacity. However, in the visual range, glass and fused quartz are both transparent, although good insulators, and finally in the ultra-violet we find the quartz transparent while the glass is opaque. But the phenomenon of transparency and its complement opacity are merely old names for the ability of the substance to pass or to obstruct radiation.

Starting from these premises, my work has been toward an appreciation of radiation which has no bearing upon the normally visible spectrum nor upon human experience.

Frankly, my efforts to transcend human experience have met with only sufficient success to provide a modicum of encouragement.

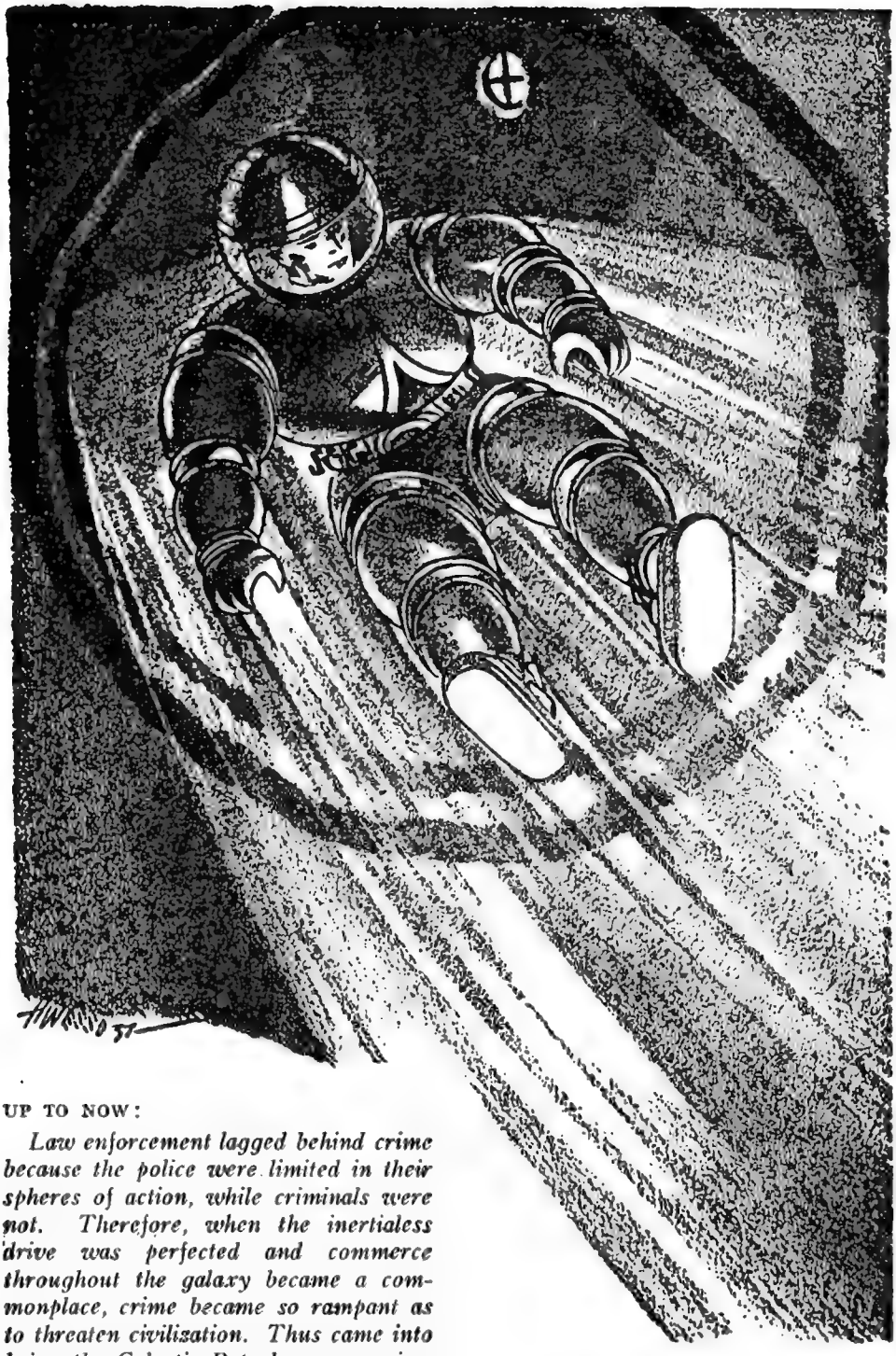
I have devised a material which, in a vague way, is similar to the polarizing sheets now in common use. You might call my N-ray screen a hybrid of the polarizing screen and the X-ray fluorescent screen. It passes light rays without distortion, being practically colorless and transparent; yet when objects are illuminated by ultra-violet light and viewed through this screen they become visible. The visibility is of the nature of fluorescence; the colors are extremely metallic in character, but there is a chromatic range which rivals that to which we are accustomed.

Such a screen hangs near the foot of my bed and ultra-violet lights play upon the room all night. When my robber friend visited me I could see him plainly, although the room was what you would call pitch dark. Special fluorescent sights on my gun made aiming easy. I could have potted him in the dark. And that, gentlemen, may give you a hint as to why foreign governments are eager to know what I have done with that very familiar laboratory phenomenon—fluorescence. You will understand it even more clearly when I tell you that we have almost perfected a high-powered unit in which battleships or airplanes may drop a vapor screen which hides our own forces from the enemy and at the same time provides a screen to make visible the ultra-violet radiation poured out by huge generators suspended by dirigibles over the enemy lines.

The cloak of invisibility has come to us. At present it is awkward and crude, but it is my hope to so refine it that within the next five years I may walk right into this room in the full glare of the lights and none of you can see me. That is not a dream; it is a possibility—a logical development in the light of what we now know. In fact, our scientists in 1937 have command of the fundamental facts which should have enabled them to do this.



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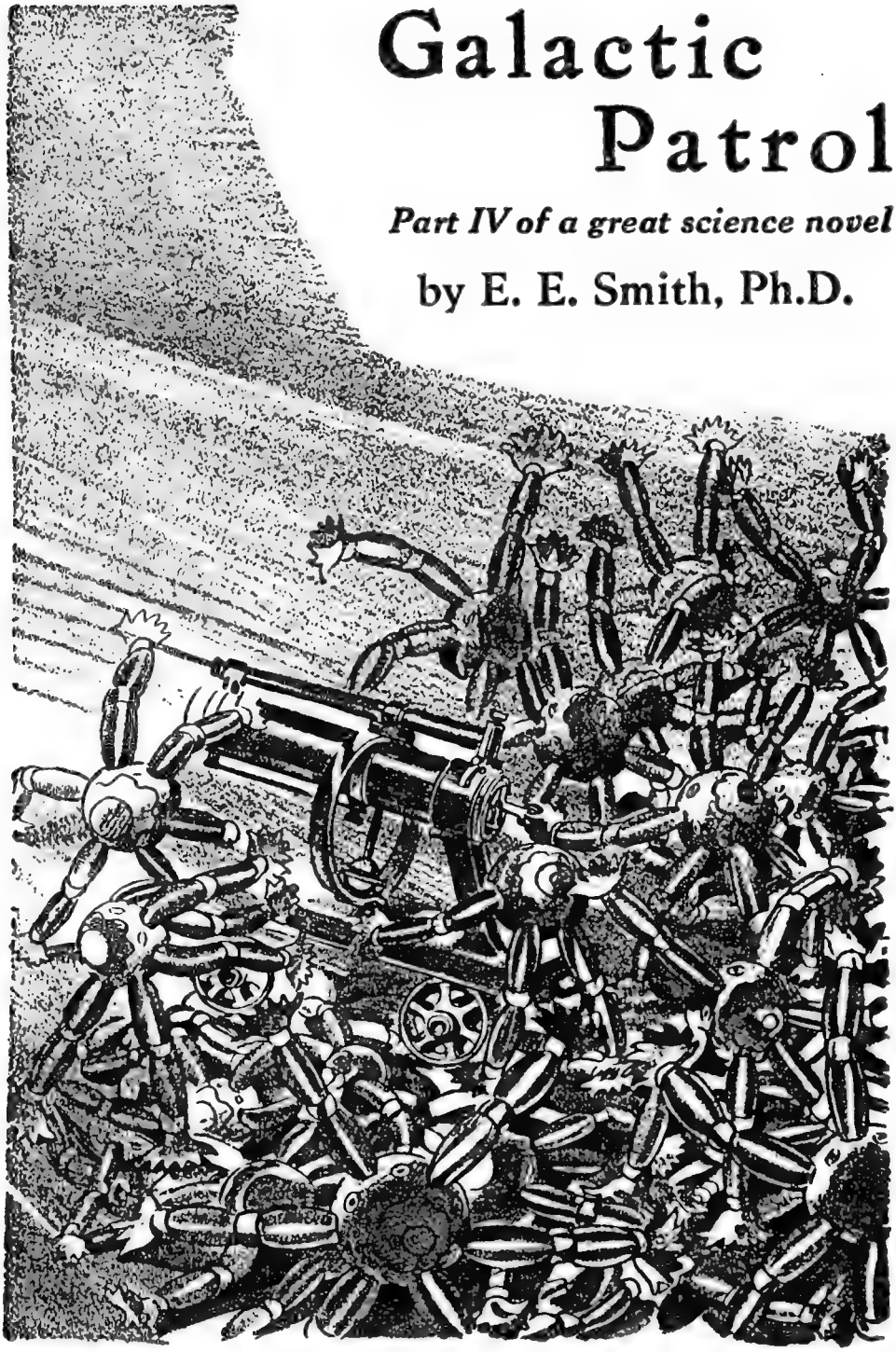
UP TO NOW:

Law enforcement lagged behind crime because the police were limited in their spheres of action, while criminals were not. Therefore, when the inertialess drive was perfected and commerce throughout the galaxy became a commonplace, crime became so rampant as to threaten civilization. Thus came into being the Galactic Patrol; an organization whose highest members, the Lens-

Galactic Patrol

Part IV of a great science novel

by E. E. Smith, Ph.D.



The rush of escaping atmosphere picked the Lensman up as though he had been a straw—hurled him out——

men, are of unlimited authority and range. Each is identified by wearing the Lens, a pseudoliving, telepathic jewel matched to the ego of its wearer by those master philosophers, the Arisians. The Lens cannot be either imitated or counterfeited, since it glows with color when worn by its owner, and since it kills any other being who attempts to wear it.

Of each million selected candidates for the Lens, all except about a hundred fall before the grueling tests employed to weed out the unfit. Kimball Kinnison graduates No. 1 in his class, and is given command of the space ship Brittania. He is informed that the pirates, or Boskonians, are gaining the uppper hand over the patrol because of a new and almost unlimited source of power, and is instructed to capture one of the new-type ships of the pirates.

He succeeds in getting the information, but cannot transmit it to Prime Base because the pirates are blanketing all channels of communication. Boskonian ships are gathering, and the crippled Brittania can neither run nor fight. Each man is given a spool of tape bearing the information, and all take to the lifeboats.

Kinnison and VanBuskirk—a Valerian, and therefore of enormous size and strength—land upon a practically unknown planet, Velantia. They aid Worsel, a scientist of that planet, in destroying a mentally parasitic race; then all the resources of the planet are devoted to the preparation of defenses against the expected Boskonian attack. Several others of the Brittania's lifeboats reach Velantia. Kinnison traces a communicator beam of Helmuth, who "speaks for Boskone," thus getting his first line upon Boskonia's Grand Base.

Six pirate vessels are captured. In the six ships, manned by Velantian crews and now blanketing the pirates' own communicators, the patrolmen set out for Earth and for the Prime Base of the patrol.

Kinnison's Bergenholm, the generator of the force which neutralizes inertia, breaks down. He is therefore forced to land upon Trenco—the planet upon which is produced thionite, the deadliest of all habit-forming drugs—for repairs, before he can go on toward Earth.

Helmuth, the Boskonian, goes to Arisia in an attempt to find out what the Lens really is, to give the Lensman such power. He is punished severely, mentally, by the Arisians, but is allowed to return to his Grand Base, alive and sane.

Kinnison, after a spectacular battle in the Earth's stratosphere, reaches Prime Base with his precious data.

XIII.

A POWERFUL FLEET had been sent to rescue those of the *Brittania's* crew who might have managed to stay out of the clutches of the pirates. The wildly enthusiastic celebration inside Prime Base was over. Outside the force walls of the reservation, however, it was just beginning. Thorndyke, VanBuskirk, and the Velantians were in the thick of it. No one on Earth, except a few planetographers, had ever heard of Velantia, and those highly intelligent reptilian beings knew even less of Tellus. Nevertheless, simply because they had aided the patrolmen, the visitors were practically given the keys to the planet, and they were enjoying the experience tremendously.

"We want Kinnison! We want Kinnison!" the festive crowd, led by Universal Telenews men, had been yelling; and finally the Lensman came out. But after one pose before a lens and a few words into a microphone, he pleaded, "There's my call, now—urgent!" and fled back inside Reservation. Then the milling tide of celebrants rolled back toward the city, taking with it every patrolman who could get leave.

Engineers and designers were swarm-

ing through and over the pirate ship Kinnison had driven home, each armed with a sheaf of blue prints already prepared from the long-cherished data spool, each directing a corps of mechanics in dismantling some mechanism of the great space rover. It was to this hive of bustling activity that Kinnison had been called. He stood there, answering as best he could the multitude of questions being fired at him from all sides, until he was rescued by no less a personage than Port Admiral Haynes.

"You gentlemen can get your information from the data sheets better than you can from Kinnison," he remarked with a smile, "and I want to take his report without any more delay."

Hand under arm, the old Lensman led the young one away. But once inside his private office he summoned neither secretary nor recorder. Instead, he pushed the buttons which set up a complete-coverage shield and spoke.

"Now, son, open up. Out with it—everything that you have been holding back ever since you landed. I got your signal."

"Well, yes, I have been holding back," Kinnison admitted. "I haven't got enough jets to be sticking my neck out in fast company, even if it were something to be discussed in public, which it is not. I'm glad you could give me this time so soon. I want to go over an idea with you, and with *no one else.* It may be as cockeyed as Trenco's ether—you are to be the sole judge as to that—but you will know, no matter how goofy it is, that I mean well."

"That certainly is not an overstatement," Haynes replied, dryly. "Go ahead."

"The great peculiarity of space combat is that we fly free, but fight inert," Kinnison began, apparently irrelevantly, but choosing his phraseology with care. "To force an engagement one ship locks to the other first with tracers, then with tractors, and goes inert. Thus, relative speed determines the ability to force or to avoid engagement; but it is relative power that determines the outcome. Heretofore, the pirates——

"AND by the way, we are belittling our opponents and building up a disastrous overconfidence in ourselves by calling them pirates. It has been thought before that they were not pirates, and now we know definitely that they are not. It is more than a race or a system. It is actually a galaxy-wide culture. It is an absolute despotism, holding its authority by means of a rigid system of rewards and punishments. In our eyes it is fundamentally wrong, but it works. *How* it works! It is organized just as we are, and is apparently as strong in bases, vessels and personnel. In my own mind I have been calling the whole culture 'Boskonia,' since no one seems to know who or what Boskone really is. Perhaps Boskone really *is* the name of the entire organization?

"But to get on with the thought. Boskonia has had all the best of it, both in speed—except for the *Brittania's* momentary advantage—and in power. That advantage is now lost to them. We will have, then, two immense powers, each galactic in scope, each tremendously powerful in arms, equipment, and personnel; each having exactly the same weapons and defenses, and each determined to wipe out the other. A stalemate is inevitable; an absolute deadlock; a sheerly destructive war of attrition which will go on for centuries and which must end in the annihilation of both Boskonia and civilization."

"But our new shears and screens!" protested the older man. "They give us an overwhelming advantage. We can force or avoid engagement, as we please. You know the plan to crush them. You helped to develop it."

"Yes, I know the plan. I also know that we will not crush them. So do you.

We both know that our advantage will be only temporary." The young Lensman, unimpressed, was in deadly earnest.

THE ADMIRAL did not reply for a time. Deep down, he himself had felt the doubt; but neither he nor any other of his school had ever mentioned the thing that Kinnison had now so boldly put into words. He knew that whatever one side had, of weapon or armor or of equipment, would sooner or later become the property of the other—as was witnessed by the desperate venture which Kinnison himself had so recently and so successfully concluded. He knew that the devices installed in the vessels captured upon Velantia had been destroyed before falling into the hands of the enemy, but he also knew that with entire fleets so equipped the new arms could not be kept secret indefinitely.

Therefore, he finally replied: "That may be true." He paused, then went on like the indomitable veteran that he was, "But we have the advantage now and we'll drive it while we've got it. After all, we *may* be able to hold it long enough."

"I've just thought of one more thing that would help: communication." Kinnison did not argue the previous point, but went ahead. "It seems to be impossible to drive any kind of a communicator beam through the double interference——"

"*Seems* to be!" barked Haynes. "It *is* impossible! Nothing but a thought——"

"That's it exactly—*thought!*" interrupted Kinnison in turn. "The Velantians can do things with a Lens that nobody would believe possible. Why not examine some of them for Lensmen? I'm sure that Worsel could pass, and probably many others. They can drive thoughts through anything except their own thought screens—and what communicators they would make!"

"That idea has distinct possibilities and will be followed up. However, it is not what you wanted to discuss. G. A.!"

"QX", Kinnison went into Lens-to-Lens communication. "I want some kind of a shield or screen that will neutralize or nullify a detector. I asked Hotchkiss, the communications expert, about it—under seal. He said that it had never been investigated, even as an academic problem in research, but that it was theoretically possible."

"This room is shielded, you know." Haynes was surprised at the use of the Lenses. "Is it *that* important?"

"I don't know. As I said before, I may be cockeyed; but if my idea is any good at all that nullifier is the most important thing in the universe, and if word of it gets out it will be absolutely useless. You see, sir, over the long route, the only really permanent advantage that we have over Boskonia, the one thing that they cannot get, is the Lens. There must be some way to use it. If that nullifier is possible, and if we can keep it a secret, I believe that I have found it. At least, I want to try something. It may not work—probably it won't; it's a mighty slim chance—but if it does, we may be able to wipe out Boskonia in a few months, instead of carrying on forever a war of attrition. First, I want to go to——"

"Hold on!" Haynes snapped. "I've been thinking, too. I can't see any possible relation between such a device and any real military weapon, or the Lens, either. If I can't, not many others can, and that's a point in your favor. If there is anything at all in your idea, it is too big to share with any one, even me. Keep it yourself."

"But it's a peculiar hook-up, and may not be any good at all," protested Kinnison. "You might want to cancel it."

"No danger of that," came the positive statement. "You know more about the pirates—pardon me, about Boskonia—than any other patrolman. You believe that your idea has some slight

chance of success. Very well—that fact is enough to put every resource of the patrol back of you. Put your idea on a tape and seal the spool in your private box in the vault, so that it will not be lost in case of your death. Then go ahead. If it is possible to develop that nullifier, you shall have it. Hotchkiss will take charge of it, and have any other Lensmen he wants. No one except Lensmen will work on it or know anything about it. Only one will be made and no records will be kept. It will not even exist until you yourself release it to us."

"Thanks, sir." And Kinnison left the room.

THEN for weeks Prime Base was the scene of an activity furious indeed. New apparatus was designed and tested; shears for tracers and tractors, generators of screens against cosmic-energy intake, scramblers for the communicators of the enemy, and many other things. Each item was designed and tested, redesigned and retested, until even the most skeptical of the patrol's engineers could no longer find in it anything to criticize. Then, throughout the galaxy, the ships of the patrol were called into their sector bases to be rebuilt.

There were to be two great classes of vessels. Those of the first were to have speed and defense—nothing else. They were to be the fastest things in space, and able to defend themselves against attack. That was all. Vessels of the second class had to be built from the keel upward, since nothing even remotely like them had theretofore been conceived. They were to be huge, ungainly, slow—simply storehouses of incomprehensibly vast powers of offense. They carried projectors of a size and power never before set upon movable foundations, nor were they dependent upon cosmic energy. They carried their own, in bank upon stupendous bank of Gargantuan accumulators. In fact, each of these monstrous floating fortresses was to be able to generate screens of such design and power that no vessel anywhere near them could receive cosmic energy!

This, then, was the bolt which civilization was preparing to hurl against Boskonia. In theory the thing was simplicity itself. The ultra-fast cruisers would catch the enemy, lock on with tractors, and go inert, thus anchoring in space. Then, while absorbing and dissipating everything that the opposition could send, they would put out a peculiarly patterned interference, the center of which could easily be located. The mobile fortresses would then come up, cut off the Boskonians' power intake, and finish up the job.

Not soon was that bolt forged; but in time civilization was ready to launch its stupendous and, it was generally hoped and believed, conclusive attack upon Boskonia. Every sector base and sub-base was ready; the zero hour had been set.

At Prime Base Kimball Kinnison, the youngest Tellurian ever to wear the four silver stripes of captain, sat at the conning plate of the cruiser *Brittania II*, so named at his own request. He thrilled inwardly as he thought of her speed. Such was her force of drive that, streamlined to the ultimate degree although she was, she had special wall shields, and special dissipators to radiate into space the heat of friction of the medium through which she tore so madly. Otherwise she would have destroyed herself in an hour of full blast, even in the hard vacuum of interstellar space!

And in his office Port Admiral Haynes watched a chronometer. Minutes to go —then seconds.

"Clear ether and light landings." His deep voice was gruff with unexpressed emotion. "Five seconds. . . . QX. . . . Lift!" And the fleet shot into the air.

THE FIRST OBJECTIVE of this solarian fleet was twofold, and this first hop was to be a short one indeed. For the Boskonians had established bases upon both Pluto and Neptune, right here in the solarian system. So close to Prime Base were these bases that only intensive screening and constant vigilance had kept their spy rays out; so powerful were they that the ordinary battleships of the patrol had been impotent against them. Now they were to be removed. Therefore the fleet, cruisers and "maulers" alike, divided into two parts; one part flashing toward Neptune, the other toward slightly more distant Pluto.

Short as was the time necessary to traverse any interplanetary distance, the solarians were detected and were met in force by the ships of Boskone. But scarcely had battle been joined when the enemy began to realize that this was to be a battle the like of which they had never before seen; and when they began to understand it, it was too late. They could not run, and all space was so full of interference that they could not even report to Helmuth what was going on. These first, peculiarly teardrop-shaped vessels of the patrol did not fight at all. They simply held on like bulldogs, taking without response everything that the white-hot projectors could hurl into them.

Their defensive screens radiated fiercely, high into the violet, under the appalling punishment being dealt out to them by the batteries of ship and shore, but they did not go down. Nor did the grip of a single tractor loosen from its anchorage. And in minutes the squat and monstrous maulers came up. Out went their cosmic-energy blocking screens, out shot their tractor beams, and out from the refractory throats of their stupendous projectors there raved the most terrifically destructive forces generable by man.

Boskonian outer screens scarcely even flickered as they went down before the immeasurable, the incredible violence of that thrust. The second course offered a briefly brilliant burst of violet radiance as it gave way. The inner screen resisted stubbornly as it ran the spectrum in a wildly coruscant display of pyrotechnic splendor; but it, too, went through the ultra-violet and into the black.

Now the wall shield itself—that inconceivably rigid fabrication of pure force, which only the instantaneous detonation of twenty metric tons of "duodec" had ever been known to rupture—was all that barred from the base metal of Boskonian walls the utterly indescribable fury of the maulers' beams. Now force was streaming from that shield in veritable torrents.

So terrible were the conflicting energies there at grips that their neutralization was actually visible and tangible. In sheets and masses, in terrific, ether-racking vortices, and in miles-long, pillaring streamers and flashes, those energies were being hurled away—hurled to all the points of the sphere's full compass, filling and suffusing all near-by space.

The Boskonian commanders stared at their instruments, first in bewildered amazement and then in sheer, stark, unbelieving horror as their power intake dropped to zero and their wall shields began to fail—and still the attack continued in never-lessening power. Surely that beaming *must* slacken down soon. No conceivable mobile plant could throw such a load for long!

But those mobile plants could—and did. The attack kept up, at the extremely high level upon which it had begun. No ordinary storage cells fed those mighty projectors; along no ordinary busbars were their Titanic amperages borne. Those maulers were designed to do just one thing—to *maul*—and that one thing they did well, relentlessly and thoroughly.

HIGHER AND HIGHER into the spectrum the defending wall shields began to radiate. At the first blast they had leaped almost through the visible spectrum, in one unbearably fierce succession of red, orange, yellow, green, blue, and indigo, up to a sultry, coruscating, blindingly hard violet. Now the doomed shields began leaping erratically into the ultra-violet. To the eye they were already invisible; upon the recorders they were showing momentary flashes of black.

Soon they went down; and in the instant of each failure one vessel of Boskonia was no more. For, that last defense gone, nothing save unresisting metal was left to withstand the ardor of those ultra-powerful, ravening beams. As has already been said, no substance, however refractory or resistant or inert, can endure even momentarily in such a field of force. Therefore, every atom, alike of vessel and of contents, went to make up the searing, seething burst of brilliant, incandescently luminous vapor which suffused all circumambient space.

Thus passed out of the scheme of things the vessels of the solarian detachment of Boskonia. Not a single vessel escaped; the cruisers saw to that. And then the attack thundered on to the bases themselves. Here the cruisers were useless; they merely formed an observant fringe, the while continuing to so blanket all channels of communication that the doomed bases could send out no word of what was happening to them. The maulers moved up and grimly, doggedly, methodically went to work.

Since a base is always much more powerfully armored than is a battleship, the reduction of these fortresses took longer than had the destruction of the fleet. But the bases could no longer draw power from the Sun or from any other heavenly body, and their other sources of power were comparatively weak. Therefore, their defenses also failed under that never-ceasing assault. Course after course their screens went down, and with the last one went the base. The maulers' beams went through metal and masonry as effortlessly as steel-jacketed bullets go through butter, and bored on, deep into the planet's bed rock, before their frightful force was spent.

Then around and around they spiraled, until nothing whatever was left of the Boskonian works; until only a seething, white-hot lake of molten lava in the midst of the planet's frigid waste was all that remained to show that anything had ever been built there.

Surrender had not been thought of. Quarter or clemency had not been asked, nor offered. Victory, of itself, was not enough. This was, and of stern necessity had to be, a war of utter, complete, and merciless extinction.

XIV.

THE ENEMY strongholds so insultingly close to Prime Base having been obliterated, the solarian fleet sailed on into space. For a few weeks game was plentiful enough. Hundreds of raiding vessels were overtaken and held by the patrol cruisers, then blasted to vapor by the maulers.

Many Boskonian bases were also reduced. The locations of most of these had long been known to the intelligence service; others were detected or discovered by the fast-flying cruisers themselves. Marauding vessels revealed the sites of others by succeeding in reaching them before being overtaken by the cruisers. Others were found by the tracers and loops of the signal corps.

Very few of these bases were hidden or in any way difficult of access, and most of them fell before the blasts of a single mauler. But if one mauler was not enough, others were summoned until it did fall. One fortress, a hitherto unknown and surprisingly strong Sector

Base, required the concentration of every mauler of the solarian fleet; but they were brought up and the fortress fell. As has been said, this was a war of extinction and every pirate base that was found was reduced.

But one day a cruiser found a base which had not even a spy-ray shield up, and a cursory inspection showed it to be completely empty. Machinery, equipment, stores, and personnel had all been evacuated. Suspicious, the patrol vessels stood off and beamed it from afar, but there were no untoward occurrences. The structures simply slumped down into lava, and that was all.

Every base discovered thereafter was in the same condition, and at the same time the ships of Boskone, formerly so plentiful, disappeared utterly from space. Day after day the cruisers sped hither and thither throughout the vast reaches of the void, at the peak of their unimaginably high pace, without finding a trace of any Boskonian vessel. More remarkable still, and for the first time in years, the ether was absolutely free from Boskonian interference.

Following an impulse, Kinnison asked and received permission to take his ship on scouting duty. At maximum blast, he drove toward the Velantian system, to the point at which he had picked up Helmuth's communication line. Along that line he drove for twenty-two solid days, halting only when a considerable distance outside the galaxy. Ahead of him there was nothing whatever except one of two distant and nebulous star clusters. Behind him there extended the immensity of the galactic lens in all its splendor. But Captain Kinnison had no eye for astronomical beauty that day.

HE HELD the *Brittania II* there for an hour, while he mulled over in his mind what the apparent facts could mean. He knew that he had covered the line, from the point of determination out beyond the galaxy's edge. He knew that his detectors, operating as they had been in clear and undistorted ether, could not possibly have missed a thing as large as Helmuth's base must be, if it had been anywhere near that line; that their effective range was immensely greater than the largest possible error in the determination or the following of the line. There were, he concluded, three possible explanations, and only three.

First, Helmuth's base might also have been evacuated. This was almost unthinkable. From what he himself knew of Helmuth that base would be as nearly impregnable as anything could be made, and it was no more apt to be vacated than was the Prime Base of the patrol. Second, Helmuth might already have the device he himself wanted so badly, and upon which Hotchkiss and the other experts had been at work so long—a detector nullifier. This was possible, distinctly so. Possible enough, at least, to warrant filing the idea for future consideration. Third, that base might not be in the galaxy at all, but in that star cluster out there straight ahead of the *Brittania II*, or possibly in one even farther away. That idea seemed the best of the three. It would necessitate ultrapowerful communicators, of course, but Helmuth could very well have them. It squared up in other ways. Its pattern fitted into the matrix very nicely.

But if that base were out there—it could stay there—for a while. The *Brittania II* just wasn't enough ship for that job. Too much opposition out there, and not—enough—ship. Or too much ship? But he wasn't ready, yet, anyway. He needed, and would get, another line on Helmuth's base. Therefore, shrugging his shoulders, he whirled his vessel about and set out to rejoin the fleet.

While a full day short of junction, Kinnison was called to his plate, to see upon its lambent surface the visage of Port Admiral Haynes.

"Did you find out anything on your trip?" he asked.

"Nothing definite, sir. Just a couple of things to think about, is all. But I can say that I don't like this at all. I don't like anything about it or any part of it."

"No more do I," agreed the admiral. "It looks very much as though your forecast of a stalemate might be about to eventuate. Where are you headed for now?"

"Back to the fleet."

"Don't do it. Stay on scouting duty for a while longer. And, unless something more interesting turns up, report back here to base. We have something that may interest you. The boys have been——"

The admiral's picture was broken up into flashes of blinding light and his words became a meaningless, jumbled roar of noise. A distress call had begun to come in, only to be blotted out by a flood of the Boskonian static interference, of which the ether had for so long been clear.

"Got its center located?" Kinnison barked at his communications officer. "They're close—right in our laps!"

"Yes, sir!" And the radio man snapped out numbers.

"Blast!" the captain commanded, unnecessarily; for the alert pilot had already set the course and his levers were even then flashing across their arcs. "I don't know what we can do, since we haven't got a thing to do anything with, if that baby is what I think it is. But believe me, we'll try!"

TOWARD the center of disturbance shot *Brittania II*, herself emitting now a scream of peculiarly patterned interference which was not only a scrambler of all possible communication throughout that whole sector of the galaxy, but also an imperative call for any mauler within that sector. So close had the *Brittania II* been to the scene of depredation that for her to reach it required only minutes.

There lay the merchantman and her Boskonian assailant. Emboldened by the cessation of piratical activities, some shipping concern had sent out a freighter, loaded probably with highly "urgent" cargo; and this was the result. The marauder, inert, had gripped her with his tractors and was beaming her into submission. She was resisting, but feebly now; it was apparent that her screens were failing. Her crew must soon open ports in token of surrender, or roast to a man; and they would probably prefer to roast.

Thus the situation in one instant. The next instant it was changed; the Boskonian discovering suddenly that his beams, instead of boring through the weak defenses of the freighter, were not even exciting to a glow the mighty protective envelopes of a cruiser of the patrol.

He switched from the diffused heat beam he had been using upon the merchantman to the hardest, hottest, most penetrating beam of annihilation he mounted—with but little more to show for it and with no better results. For the *Brittania II's* screens had been designed to stand up almost indefinitely against the most potent beams of any space ship, and they stood up. Increase power as he would, to whatever ruinous overload, the pirate could not break down Kinnison's screens; nor, dodge as he would, could he again get in position to attack his former prey. And eventually the mauler arrived; fortunately it, too, had been fairly close by. Out reached its mighty tractors. Out raved one of its tremendous beams, striking the Boskonian's defenses squarely amidships.

That beam struck and the pirate ship disappeared—but not in a hazily incandescent flare of volatilized metal. The

raider disappeared bodily, and still all in one piece. He had put out shears of his own, snapping even the mauler's tractors like threads; and the velocity of his departure was due almost as much to the pressor effect of the patrol beam as it was to the thrust of his own powerful drivers.

It was the beginning of the stalemate Kinnison had foreseen.

"I was afraid of that," the young captain muttered; and, paying no attention whatever to the merchantman, he called the commander of the mauler. At this close range, of course, no possible ether scrambler could interfere with visual apparatus, and there on his plate he saw the face of Clifford Maitland, the man who graduated No. 2 in his own class.

"Hi, Kim, you old space flea!" Maitland exclaimed in delight. "Oh, pardon me, sir," he went on in mock deference, with an exaggerated salute. "To a guy with four jets, I should say——"

"Seal that, Cliff, or I'll climb up you like a squirrel, first chance I get!" Kinnison retorted. "So they've got you skippering one of the big battle wagons, huh? Lucky stiff! Think of a mere infant like you being let play with so much high power. But what'll we do about this heap here?"

"Damn if I know. It isn't covered, so you'll have to tell me, captain."

"Who am I to be passing out orders? As you say, it isn't covered in the book. It's against G I regs for them to be cutting our tractors. But he's all yours, not mine. I've got to flit. You might find out what he's carrying, from where, to where, and why. Then, if you want to, you can escort him either back where he came from or on to where he's going, whichever you think best. If this interference dies out, you'd better report to Prime Base and get some real orders. If it doesn't, use your own judgment, if any. Clear ether, Cliff, I've got to buzz along."

"Free landings, space hound!"

"Now, Vic"—Kinnison turned to his pilot—"we've got urgent business at base. And when I say 'urgent' I don't mean perchance. Let's see you burn a hole in the ether." And that worthy snapped his levers over to maximum blast.

THE *BRITTANIA II* made the run to Prime Base in a few days, and scarcely had she touched ground when Kinnison was summoned to the office of the port admiral. As soon as he was announced, Haynes brusquely cleared his office and sealed it against any possible form of intrusion or eavesdropping before he spoke. He had aged noticeably since these two had had that memorable conference in this same room. His face was lined and careworn; his eyes and his entire mien bore witness to days and nights of sleeplessly continuous work.

"You were right, Kinnison," he began, abruptly. "A stalemate it is, a hopeless deadlock. I called you in to tell you that Hotchkiss has your nullifier done, and that it works perfectly against all long-range stuff. It works fairly well on vision, except at close range. Against electromagnetics, however, it is not very effective. About all that can be done, it seems, is to shorten the range; it has not been possible, as yet, to develop a screen against magnetism. Perhaps we expected too much."

"I can get by with that, I think. I will be out of electromagnetic range most of the time, and nobody watches their electros very close, anyway. Thanks a lot. It's ready to install?"

"Doesn't need installation. It's such a little thing you can put it in your pocket. It's self-contained and will work anywhere."

"Better and better. In that case I'll need two of them—and a ship. I would like to have one of those new automatic

speedsters.* Lots of legs, cruising range, and screens. Only one beam, but I probably won't use even that one so——"

"Going *alone?*" interrupted Haynes. "Better take a battle cruiser, at least. I don't like the idea of your going out there alone."

"I don't particularly relish the prospect, either. But it's got to be that way. The whole fleet, maulers and all, isn't enough to do by force what's got to be done, and even two men are too many to do it in the only way it can be done. You see, sir——"

"No explanations, please. It's on the spool, where we can get it if we need it. Are you informed as to the latest developments?"

"No, sir. I heard a little coming in, but not much."

"We are almost back where we were before you took off in the *Brittania II.* Commerce is almost at a standstill, all over the galaxy. All shipping firms are practically idle. But that is neither all of it nor the worst of it. You may not realize how important interstellar trade is; but as a result of its stoppage general business has slowed down tremendously. As is only to be expected, perhaps, complaints are coming in by the thousand because we have not already blasted the pirates out of space, and demands that we do so at once. They do not understand the true situation, nor realize that we are doing all that we can do. We cannot send a mauler with every freighter and liner, and mauler-escorted vessels are the only ones to arrive at their destinations."

"But why? With tractor shears on all ships, how can they hold them?" asked Kinnison.

"Magnets!" snorted Haynes. "Plain, old-fashioned electromagnets. No pull to speak of, at a distance, of course, but with the raider running free, a millionth of a dyne is enough. Close up—lock on—board and storm—all done!"

"Hm-m-m. That changes things. I've got to find a pirate ship. I was planning on following a freighter or liner out toward Alsakan. But if there aren't any to follow—I'll have to hunt around some——"

"That is easily arranged. Lots of them want to go. We will let one go, with a mauler accompanying her, but well outside detector range."

"That covers everything, then, except the assignment. I can't very well ask for leave, but maybe I could be put on special assignment, reporting direct to you?"

"SOMETHING better than that." And Haynes smiled broadly, in genuine pleasure. "Everything is fixed. Your release has been entered in the books. Your commission as captain has been canceled, so leave your uniform in your former quarters. Here is your credit book and here is the rest of your kit. You are now an unattached Lensman."

The release! The goal toward which all Lensmen strive, but which so comparatively few attain, even after years of work! He was now a free agent, responsible to no one and to nothing save his own conscience. He was no longer of Earth, nor of the solarian system, but of the galaxy as a whole. He was no longer a tiny cog in the immense

* Unlike the larger war vessels of the patrol, speedsters are very narrow in proportion to their length, and in their design nothing is considered save speed and maneuverability. Very definitely they are not built for comfort. Thus, although their gravity plates are set for horizontal flight, they have braking jets, under jets, side jets, and top jets, as well as driving jets; so that in inert maneuvering any direction whatever may seem "down," and that direction may change with bewildering rapidity.

Nothing can be loose in a speedster. Everything, even to the food supplies in the refrigerators, must be clamped into place. Sleeping is done in hammocks, not in beds. All seats and resting places have heavy safety straps, and there are no loose items of furniture or equipment anywhere on board.

Because they are designed for the utmost possible speed in the free condition, speedsters are extremely cranky and tricky in inert flight, unless they are being handled upon their under jets, which are designed and placed specifically and only for inert flight.

Some of the ultra-fast vessels of the pirates, as will be brought out later, were also of this shape and design.

machine of the Galactic Patrol; wherever he might go, throughout the immensity of the entire island universe, he *would be* the Galactic Patrol!

"Yes, it's real." The older man was enjoying the youngster's stupefaction at his release, reminding him as it did of the time, long years ago, when he had won his own. "You go anywhere you please and do anything you please, for as long as you please. You take anything you want, whenever you want it, with or without giving reasons—although you will usually give a thumb-printed credit slip in return. You report if, as, when, where, how, and to whom you please—or not, as you please. You don't even get a salary any more. You help yourself to that, too, wherever you may be—as much as you want, whenever you want it."

"But, sir—I—you—— I mean—that is——" Kinnison gulped three times before he could speak coherently. "I'm not ready, sir. Why, I'm nothing but a kid. I haven't got enough jets to swing it. Just the bare thought of it scares me into hysterics!"

"It would. It always does." The admiral was very much in earnest now, but it was a glad, proud earnestness. "You are to be as nearly absolutely free an agent as it is possible for a living, flesh-and-blood creature to be. To the man on the street that would seem to spell a condition of perfect bliss. Only a gray Lensman knows what a frightful load it really is; but it is a load that such a Lensman is glad and proud to carry."

"Yes, sir, he would be, of course, if he——"

"That thought will bother you for a time—if it did not, you would not be here—but do not worry about it any more than you can help. All I can say is that in the opinion of those who should know, not only have you proved yourself ready for release, but also you have earned it."

"How do they figure that out?" Kinnison demanded, hotly. "All that saved my bacon on that trip was luck—a burned-out Bergenholm—and at the time I thought that it was bad luck, at that. And VanBuskirk and Worsel and the other boys and Heaven knows who else pulled me out of jam after jam. I'd like awfully well to believe that I'm ready, sir, but I'm not. I can't take credit for pure dumb luck and for other men's ablilities."

"Well, coöperation is to be expected, and we like to make gray Lensmen out of the lucky ones." Haynes laughed deeply. "It may make you feel better, though, if I tell you two more things: first, that so far you have made the best showing of any man yet graduated from Wentworth Hall; second, that we of the court believe you would have succeeded in that almost impossible mission without VanBuskirk, without Worsel, and without the lucky failure of the Bergenholm. In a different, and now, of course, unguessable fashion, but succeeded, nevertheless. Nor is this to be taken as in any sense a belittlement of the very real abilities of those others, nor a denial that luck, or chance, does exist. It is merely our recognition of the fact that you have what it takes to be an unattached Lensman.

"Seal it now, and buzz off!" he commanded, as Kinnison tried to say something; and, clapping him on the shoulder, he turned him around and gave him a gentle shove toward the door. "Clear ether, lad!"

"Same to you, sir—all of it there is. I still think that you and all the rest of the court are cockeyed; but I'll try not to let you down." And the newly unattached Lensman blundered out. He stumbled over the threshold, bumped against a stenographer who was hurrying along the corridor, and almost barged into the jamb of the entrance door instead of going through the opening. Outside he regained his physical

poise and walked on air toward his quarters; but he never could remember afterward what he did or whom he met on that long, fast hike. Over and over the one thought pounded in his brain: unattached! *Unattached!!* UNATTACHED!!

AND BEHIND HIM, in the port admiral's office, that high official sat and mused, smiling faintly with lips and eyes, staring unseeingly at the still-open doorway through which Kinnison had staggered. The boy had measured up in every particular. He would be a good man. He would marry. He did not think so now, of course—in his own mind his life was consecrate—but he would. If necessary, the patrol itself would see to it that he did. There were ways, and such stock was altogether too good not to be propagated. And, fifteen years or so from now—if he lived—when he was no longer fit for the grinding, grueling life to which he now looked forward so eagerly, he would select the Earthbound job for which he was best fitted and would become a good executive. For such were the executives of the patrol. But this daydreaming was getting him nowhere, fast; he shook himself and plunged again into his work.

Kinnison reached his quarters at last, realizing with a thrill that they were no longer his. He now had no quarters, no residence, no address. Wherever he might be, throughout the whole of illimitable space, there was his home. But, instead of being dismayed by the thought of the life he faced, he was filled by a fierce eagerness to be actually living it.

There was a tap at his door and an orderly entered, carrying a bulky package.

"Your grays, sir," he announced, with a crisp salute.

"Thanks." Kinnison returned the salute as smartly; and, almost before the door had closed, he was stripping off the space black-and-silver gorgeousness of the captain's uniform he wore, and was donning gray.

The gray—the unadorned, neutral-colored leather that was the proud garb of that branch of the patrol to which he was thenceforth to belong. It had been tailored to his measurements, and he could not help studying with approval his reflection in the mirror: the round, almost visorless cap, heavily and softly quilted in protection against the helmet of his armor; the heavy goggles, opaque to all radiation harmful to the eyes; the short jacket, emphasizing broad shoulders and narrow waist; the trim breeches and high-laced boots, incasing powerful, tapering legs.

"What an outfit—*what* an outfit!" he breathed. "And maybe I ain't such a bad-looking ape, at that, in these grays!" He did not then, and never did realize that he was wearing the plainest, drabbest, most strictly utilitarian uniform in the known universe; for to him, as to all others who knew it, the sheer, stark simplicity of the unattached Lensman's plain gray leather transcended by far the gaudy trappings of the other branches of the service. He admired himself boyishly, as men do, feeling a trifle ashamed in so doing; but he did not then and never did appreciate what a striking figure of a man he really was as he strode out of quarters and down the wide avenue toward the *Brittania II's* dock.

HE WAS GLAD indeed that there had been no ceremony or public show connected with this, his real and only important graduation. For as his fellows—not only his own crew, but also his friends from all over the Reservation—thronged about him, mauling and pummeling him in congratulation and acclaim, he knew that he couldn't stand much more. If there were to be much more of it, he discovered suddenly, he

would either pass out cold or cry like a baby. He didn't quite know which.

That whole howling, chanting mob clustered about him; and, considering it an honor to carry the least of his personal belongings, formed a yelling, cap-tossing escort. Traffic meant nothing whatever to that pleasantly mad crew, nor, temporarily, did regulations. Let traffic detour; let pedestrians, no matter how august, cool their heels; let cars, trucks, yes, even trains, wait until they got past; let everything wait, or turn around and go back, or go some other way. Here comes Kinnison! Kinnison, gray Lensman! Make way! And way was made—from the *Brittania II's* dock clear across base to the slip in which the Lensman's new speedster lay.

And what a ship this little speedster was! Trim, trig, streamlined to the ultimate she lay there, quiescent but surcharged with power. Almost sentient she was, this power-packed, ultra-racy little fabrication of space-toughened alloy, instantly ready at his touch to liberate those tremendous energies which were to hurl him through the infinite reaches of the cosmic void.

None of the mob came aboard, of course. They backed off, still frantically waving and throwing whatever came closest to hand; and as Kinnison touched a button and shot into the air he swallowed several times in a vain attempt to dispose of an amazing lump which had somehow appeared in his throat.

XV.

IT SO HAPPENED that for many long weeks there had been lying in New York space port an urgent shipment for Alsakan. And not only was that urgency a one-way affair. For, with the possible exception of a few packets, whose owners had locked them in vaults and would not part with them at any price, there was not a single Alsakanite cigarette left on Earth!

Luxuries, then as now, soared feverishly in price with scarcity. Only the rich smoked Alsakanite cigarettes, and to those rich the price of anything they really wanted was a matter of almost complete indifference. And plenty of them wanted, and wanted badly, their Alsakanite cigarettes. There was no doubt of that.

The current market report upon them was: "Bid, one thousand credits per packet of ten. Offered, none at any price."

With that ever-climbing figure in mind, a merchant prince named Matthews had been trying to get an Alsakanbound ship into the ether. He knew that one cargo of Alsakanite cigarettes safely landed in any Tellurian space port would yield more profit than could be made by his entire fleet in ten years of normal trading. Therefore, he had for weeks been pulling every wire, and even every string, that he could reach—political, financial, even at times verging altogether too close for comfort upon the criminal—but without results.

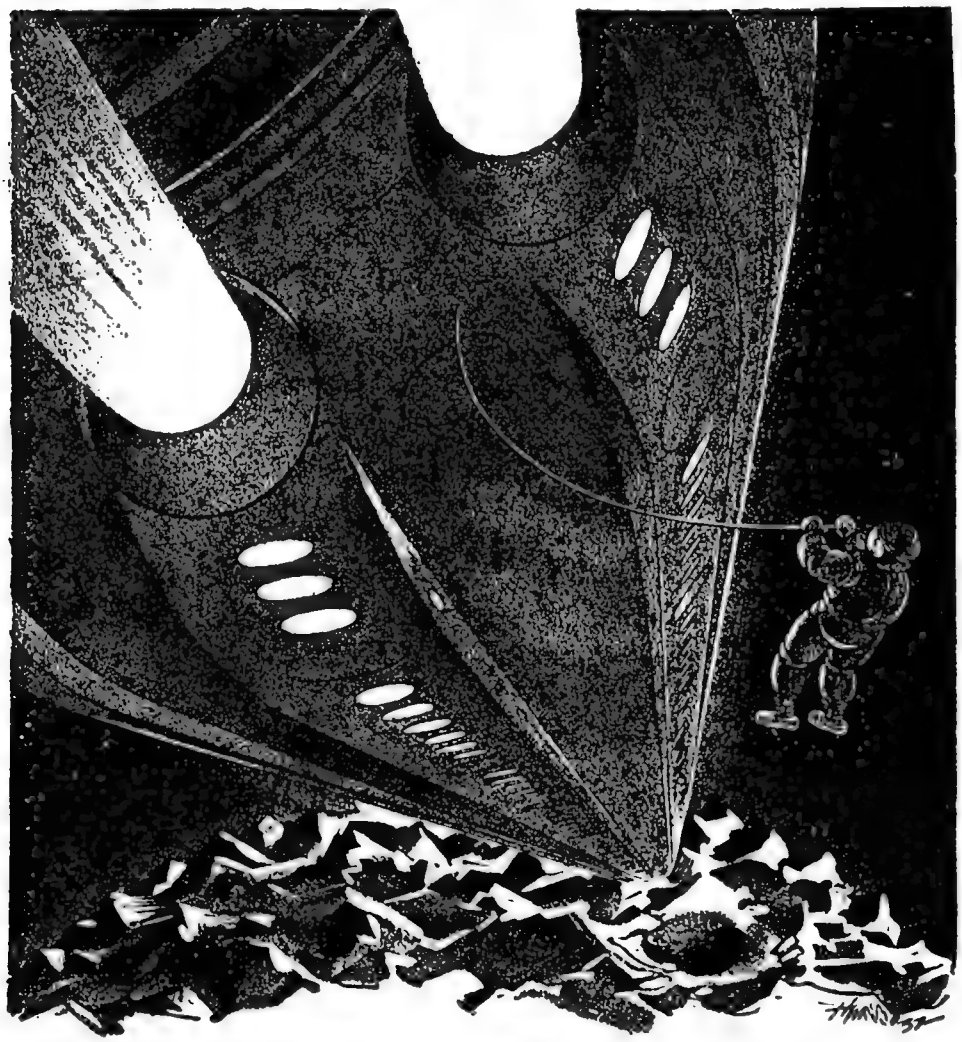
For, even if he could find a crew willing to take the risk, to launch the ship without an escort would be out of the question. There would be no profit in a ship that did not return to Earth. The ship was his, to do with as he pleased, but the escorting maulers were assigned solely by the Galactic Patrol, and that patrol would not give his ship an escort.

In answer to his first request, he had been informed that only cargoes classed as necessary were being escorted at all regularly; that seminecessary loads were escorted occasionally, when of a particularly useful or desirable commodity and if opportunity offered; that luxury loads, such as his, were not being escorted at all; that he would be notified if, as, and when the *Prometheus* could be given escort. Then the merchant prince began his siege.

POLITICIANS of high rank, local and national, sent in "requests" of varying degrees of diplomacy. Financiers first offered inducements, then threatened to "bear down," then put on all the various kinds of pressure known to their pressure-loving ilk. Pleas, demands, threats, and pressures were alike, however, futile. The patrol could not be coaxed or bullied, cajoled, bribed, or cowed; and all further communications upon the subject, from whatever source originating, were ignored.

Having exhausted his every resource of diplomacy, politics, guile, and finance, the merchant prince resigned himself to the inevitable and stopped trying to get his ship off the ground.

Then, like the proverbial bolt from the blue, New York sub-base received from Prime Base an open message, not even coded, which read:



Matching course and velocity, he crept up—flung his magnet, pulled up, hand over hand——

Authorize space ship *Prometheus* to clear for Alsakan at will, escorted by patrol ship B 42 TC 838, whose present orders are hereby canceled. Signed, Haynes.

A demolition bomb dropped into that sub-base would not have caused greater excitement than did that message. Neither the base commander, the captain of the mauler, the captain of the *Prometheus,* nor the highly pleased but equally surprised Matthews could explain it; but all of them did whatever they could to expedite the departure of the freighter. She was, and had been for a long time, practically ready to sail.

As the base commander and Matthews sat in the office, shortly before the scheduled time of departure, Kinnison arrived—or, more correctly, let them know that he was there. He invited them both into the control room of his speedster; and invitations from gray Lensmen were accepted without question or demur.

"I suppose that you are wondering what this is all about," he began. "I'll make it as short as I can. I asked you in here because this is the only convenient place in which I *know* that what we say will not be overheard. There are lots of spy rays around here, whether you know it or not. The *Prometheus* is to be allowed to go to Alsakan, because that is where pirates seem to be most numerous, and we do not want to waste time hunting all over space to find one.

"Your vessel was selected, Mr. Matthews, for three reasons, and in spite of the attempts you have been making to obtain special privileges, not because of them: first, because there is no necessary or seminecessary freight waiting for clearance into that region; second, because we do not want your firm to fail. We do not know of any other large shipping line in such a shaky position as yours, nor of any firm anywhere to which one single cargo would make such an immense financial difference."

"You are certainly right there, Lensman!" Matthews agreed, whole-heartedly. "It means bankruptcy on the one hand and a fortune on the other."

"HERE'S WHAT is to happen. The ship and the mauler blast off on schedule, fourteen minutes from now. They get about to Valeria, when they are both recalled—urgent orders for the mauler to go on rescue work. The mauler comes back, but your captain will, in all probability, keep on going, saying that he started out for Alsakan and that's where he's going——"

"But he wouldn't. He wouldn't *dare!*" gasped the ship owner.

"Sure he would," Kinnison insisted, cheerfully enough. "That is the third good reason your vessel is being allowed to set out: because it certainly will be attacked. You didn't know it until now, but your captain and over half of your crew are pirates themselves, and——"

"What? Pirates!" Matthews bellowed. "I'll go down there and——"

"You'll do nothing whatever, Mr. Matthews, except watch things, and you will do that from here. The situation is entirely under control."

"But my ship! My cargo!" the shipper wailed. "We'll be ruined if——"

"Let me finish, please," the Lensman interrupted. "As soon as the mauler turns back it is practically certain that your captain will send out a message, letting the pirates know that he is easy prey. Within a minute after sending that message, he dies. So does every other pirate aboard. Your ship lands on Valeria and takes on a crew of space-fighting wildcats, headed by Peter Van-Buskirk. Then it goes on toward Alsakan. When the pirates board that ship, after its prearranged, half-hearted resistance and easy surrender, they are going to think that all hell's out for noon. Especially since the mauler, back from

her 'rescue work,' will be tagging along, not too far away."

"Then my ship will really go to Alsakan, and back, safely?" Matthews was almost dazed. Matters were entirely out of his hands, and things had moved so rapidly that he hardly knew what to think. "But if my own crews are pirates, some of them may—— But I can, of course, get police protection if necessary."

"Unless something entirely unforseen happens, the *Prometheus* will make the round trip in safety, cargoes and all —under mauler escort all the way. You will, of course, have to take the other matter up with your local police."

"When is the attack to take place, sir?" asked the base commander.

"That's what the mauler skipper wanted to know when I told him what was ahead of him." Kinnison grinned. "He wanted to sneak up a little closer about that time. I'd like to know, myself, but unfortunately that will have to be decided by the pirates after they get the signal. It will be on the way out, though, because the cargo she has aboard now is a lot more valuable to Boskone than a load of Alsakanite cigarettes would be."

"But do you think you can take the pirate ship that way?" asked the commander, dubiously.

"No. But he will cut down his personnel to such an extent that he will have to head back for base."

"And that's what you want—the base. I see."

He did not see—quite—but the Lensman did not enlighten him further.

THERE WAS a brilliant double flare as freighter and mauler lifted into the air. Kinnison showed the ship owner out.

"Hadn't I better be going, too?" asked the commander. "Those orders, you know."

"A couple of minutes yet. I have another message for you—official. Matthews won't need a police escort long—if any. When that ship is attacked it is to be the signal for cleaning out every pirate in Greater New York—the worst pirate hotbed on Tellus. Neither you nor your force will be in on it directly, but you might pass the word around, so that our own men will be informed ahead of the Telenews outfits."

"Good! That has needed doing for a long time."

"Yes. But you know it takes a long time to line up every man in such a big organization. They want to get them all, without getting any innocent bystanders."

"Who's doing it? Prime Base?"

"Yes. Enough men will be thrown in here to do the whole job in an hour."

"That *is* good news. Clear ether, Lensman!" And the base commander went back to his post.

As the air-lock toggles rammed home, sealing the exit behind the departing visitor, Kinnison eased his speedster into the air and headed for Valeria. Since the two vessels ahead of him had left atmosphere inertialess, as would he, and since several hundred seconds had elapsed since their take-off, he was, of course, some ten thousand miles off their line as well as being uncounted millions of miles behind them. But the larger distance meant no more than the smaller, and neither of them meant anything at all to the patrol's finest speedster. Kinnison, on easy touring blast, caught up with them in minutes. Closing up to less than one light year, he slowed his pace to match theirs and held his distance.

Any ordinary ship would have been detected instantly—long since, in fact—but Kinnison rode no ordinary ship. His speedster was immune to all detection save electromagnetic or visual, and, therefore, even at that close range—the travel of half a minute for even a slow space ship in open space—he was safe.

For electromagnetics are useless at that distance; and visual apparatus, even with sub-ether converters, is reliable only up to a few mere thousands of miles, unless the observer knows exactly what to look for and where to look for it.

KINNISON, then, closed up and followed the *Prometheus* and her mauler escort; and as they approached the Valerian solar system, sure enough, the recall messages came booming in. Also, as had been expected, the renegade captain of the freighter sent back, first his defiant answer, and then his message to the pirate high command. The mauler turned back; the merchantman kept on. Suddenly, however, she stopped, inert, and from her ports were ejected discrete bits of matter—probably the bodies of the Boskonian members of her crew. Then the *Prometheus*, again inertialess, flashed directly toward the planet Valeria.

An inertialess landing is, of course, highly irregular, and is made only when the ship is to take off again immediately. It saves all the time ordinarily lost in spiraling and deceleration, and saves the computation of a landing orbit, which is no task for an amateur computer. It is, however, dangerous.

It takes power, plenty of it, to maintain the force which neutralizes the inertia of mass, and if that force fails, even for an instant, while a ship is upon a planet's surface, the consequences are usually highly disastrous. For in the neutralization of inertia there is no magic, no getting of something for nothing, no violation of Nature's law of the conservation of matter and energy. The instant that force becomes inoperative the ship possesses exactly the same velocity, momentum, and inertia that it possessed at the instant the force took effect.

Thus, if a space ship takes off from Earth, with its orbital velocity of about eighteen and one half miles per second relative to the Sun, goes free, dashes to Mars, lands free, and then goes inert, its original velocity, both in speed and in direction, is instantly restored, with consequences better imagined than described. Such a velocity, of course, *might* take the ship harmlessly into the air; but it probably would not.

But the *Prometheus* landed free, and and so did Kinnison. He stepped out, fully armored against Valeria's extremely heavy atmosphere and laboring a trifle under its terrific gravitation, to be greeted cordially by *Lieutenant* VanBuskirk, whose fighting men were already streaming aboard the freighter.

"Hi, chief!" the Dutchman called, gayly. "Everything went off like clockwork. Won't hold you up long—be blasting off in ten minutes."

"Ho, Lefty!" the Lensman acknowledged, as cordially, but saluting the newly commissioned officer with an exaggerated formality. "Say, Bus, I've been doing some thinking. Why wouldn't it be a good idea to——"

"Uh-uh, it would *not*," denied the fighter, positively. "I know what you're going to say—that you want in on this party—but don't say it."

"But I——" Kinnison began to argue.

"Nix," the Valerian declared flatly. "You've got to stay with your speedster. No room for her inside, as she's full to the last meter with cargo and with my men. You can't clamp on outside, as that would give the whole thing away. And besides, for the first and last time in my life I've got a chance to give a gray Lensman orders. Those orders are to stay out of and away from this ship—and I'll see to it that you do, too, you little Tellurian wart! Boy, what a kick I get out of that!"

"You would, you big, dumb Valerian ape. You always were a small-souled type!" Kinnison retorted. "Piggy-piggy—— Haynes, huh?"

"Uh-huh." VanBuskirk nodded. "How else could I talk so rough to *you* and get away with it? However, don't

slaughter—such as the pirates had expected to find.

INSTEAD of such a crew the boarders met a force that was overwhelmingly superior to their own—not only in point of numbers, but even more markedly in the strength and agility of its units. Also, the defenders were more capably armed than were the attackers, since, in addition to the efficient armor of the patrol and its ultra-deadly portable weapons, at least one of those terrific semiportable projectors commanded every corridor of the freighter. In the blasts of those projectors most of the pirates died instantly, not knowing what struck them, not even knowing that they died.

They were the fortunate ones. The others knew what was coming and saw it as it came, for the Valerians did not even draw their DeLameters. They knew that the pirates' armor could withstand for many minutes any hand weapon's beams, and they disdained to remount the heavy semiportables. They came in with their space axes, and at the sight the pirates broke and ran screaming in panic fear. But they could not escape. The toggles of the exit port were not only in their sockets, but they were also locked in them.

Therefore, the storming party died to the last man; and, as VanBuskirk had foretold, it was scarcely even a struggle. For any ordinary space armor is just so much tin against a Valerian swinging a space ax.

The spy ray of the pirate captain got through just in time to see the ghastly finale of the massacre, and his face turned first purple, then white.

"The patrol!" he gasped. "Valerians—a whole company of them! I'll say we've been double-crossed!"

"Righto—we've jolly well been," the pilot agreed. "You don't know the half of it yet, either. Somebody's coming, and it isn't a boy scout. If a mauler should suck us in, we'd be very much a spent force, what?"

"Cut out the conversation!" snapped the captain. "Is it a mauler, or not?"

"A bit too far away yet to say, but it probably is. They wouldn't have sent those jaspers out without cover, old bean. They knew that we can burn that freighter's screens down in an hour. Better cut the beams and get ready to run, what?"

The commander did so, wild thoughts racing through his mind. If a mauler got close enough to him to use magnets, he was done. Cutting arcs would burn through his armor like cheese, and he had no fighting men left. And even if he had—even a full crew of the most savage fighters known would have to be inescapably cornered before they would mix it with what that mauler had aboard. He would have to go back to base, anyway——"

"Tally ho, old fruit!" The pilot slammed his levers over to maximum blast. "It's a mauler and we've been bloody well jobbed. Back to base?"

"Yes." And the discomfited captain energized his communicator, to report to his immediate superior the humiliating outcome of the supposedly carefully planned coup.

XVI.

AS THE PIRATE fled into space Kinnison followed, matching his quarry in course and speed. He then cut in the automatic controller on his drive, the automatic recorder on his plate, and began to tune in his beam tracer; only to be brought up short by the realization that the spy ray's point would not stay in the pirate's control room without constant attention and manual adjustment. He had known that, too. Even the most precise of automatic controllers, driven by the most carefully stabilized electronic currents, are prone to slip twenty feet or so at even such close range as ten

feel too bad. You aren't missing a thing, really. This thing is in the cans already, and your fun is up ahead somewhere. And by the way, Kim, congratulations. You had it coming. We're all behind you, from here to the next universe and back."

"Thanks. And the same to you, Bus, and many of 'em. Well, if you won't let me stow away, I'll tag along behind, I guess. Clear ether—or rather, I hope it's full of pirates by to-morrow morning. Won't be, though, probably; don't imagine they'll move until we're almost there."

AND TAG ALONG Kinnison did, through thousands and thousands of parsecs of uneventful voyage.

Part of the time he spent in the speedster, dashing hither and yon. Most of it, however, he spent in the vastly more comfortable mauler; to the armored side of which his tiny vessel clung with its magnetic clamps while he slept and ate, gossiped and read, exercised and played with the mauler's officers and crew, in deep-space comradery. It so happened, however, that when the long-waited attack developed he was out in his speedster, and thus saw and heard everything from the beginning.

Space was filled with the old, familiar interference. The raider flashed up, locked on with magnets, and began to beam. Not heavily—scarcely enough to warm up the defensive screens—and Kinnison probed into the pirate with his spy ray.

"Terrestrials—and Americans!" he exclaimed, half aloud, startled for an instant. "But naturally they would be, since this is a put-up job and over half the crew were New York gangsters."

"The blighter's got his spy-ray screens up," the pilot was grumbling to his captain. The fact that he spoke in English was immaterial to the Lensman; he would have understood equally well any other possible form of communication or of thought exchange. "That wasn't part of the plan, was it?"

If Helmuth, or one of the able minds at his base, had been directing that attack it would have stopped right there. The pilot had shown a flash of feeling that, with a little encouragement, might have grown into a suspicion.

But the captain was not an imaginative man. Therefore: "Nothing was said about it, either way," he replied. "Probably the mate's on duty. He is not one of us, you know. All the better if he is. The captain will open up. If he doesn't do it pretty quick, I'll open her up myself. There, the port's opening. Slide a little forward. . . . Hold it! Go get 'em, men!"

Then men, hundreds of them, armed and armored, swarmed through the freighter's locks. But as the last man of the boarding party passed the portal something happened that was most decidedly not on the program: the outer port slammed shut and its toggles drove home!

"Blast those screens! Knock them down! Get in there with a spy ray!" barked the pirate captain. He was not one of those hardy and valiant souls who, like Gildersleeve, led, in person, the attacks of his cutthroats. He emulated, instead, the higher Boskonian officials and directed his raids from the safety of his control room; but, as has been intimated, he was unlike those officials in that he lacked directorial ability. Thus it was only after it was too late that he became suspicious. "I wonder if somebody could have double-crossed us? Hijackers?"

"We'll soon know," the pilot growled, and even as he spoke the spy ray got through, revealing a very shambles.

For VanBuskirk and his Valerians had not been caught napping, nor were they a crew—unarmored, partially armed, and rendered even more impotent by internal mutiny, strife, and

million miles, especially in the bumpy ether near solar systems, and there was nothing to correct the slip. He had not thought of that before; the pilot always made those minor corrections as a matter of course.

But now he was torn between two desires. He wanted to listen to the conversation that would ensue as soon as the pirate captain got into communication with his superior officers; and, especially should Helmuth put in his beam, he very much wanted to trace it and thus secure another line on the headquarters he was so anxious to locate. He now feared that he could not do both—a fear that soon was to prove well-grounded—and wished fervently that for a few minutes he could be two men—or at least a Velantian; they had eyes and hands and separate brain compartments enough so that they could do half a dozen things at once and do each one well. He could not; but he could try. Maybe he should have brought one of the boys along, at that. No, that would wreck everything, later on; he would have to do the best he could.

Communication was established and the pirate captain began to make his report. By using one hand on the ray and the other on the tracer, Kinnison managed to get a partial line and to record scraps of the conversation. He missed, however, the essential part of the entire episode, that part in which the base commander turned the unsuccessful captain over to Helmuth himself. Therefore, Kinnison was surprised indeed at the disappearance of the beam he was so laboriously tracing, and to hear Helmuth conclude his castigation of the unlucky captain with:

"—not entirely your fault. We will not punish you at all severely this time. Report to our base on Aldebaran I. Turn your vessel over to base commander there and do anything he tells you to do for thirty of the days of that planet."

Frantically, Kinnison drew back his tracer and searched for Helmuth's beam; but before he could synchronize with it the message of the pirates' high chief was finished and his beam was gone. The Lensman sat back in thought.

Aldebaran! Practically next door to his own solarian system, from which he had come so far. How had they possibly managed to keep concealed, or to re-establish, a base so close to Sol, through all the intensive searching that had been done? But they *had*. That was the important thing. Anyway, he knew where he was going, and that helped.

One other thing he hadn't thought of—and one that might have spoiled everything—was the fact that he couldn't stay awake indefinitely to follow that ship! He had to sleep sometime, and while he was asleep his quarry was bound to escape. He, of course, had a CRX tracer, which would hold a ship without attention as long as it was anywhere within even extreme range; and it would have been a simple enough matter to have had a photo-cell relay put in between the plate of the CRX and the automatic controls of the spacer and driver—but he had not asked for it. Well, luckily, he now knew where he was going, and the trip to Aldebaran would be long enough for him to build a dozen such controls. He had all the necessary parts and plenty of tools. It would give him something to do to break the monotony of the voyage.

THEREFORE, following the pirate ship easily as it tore through space, Kinnison built his automatic "chaser," as he called it. During each of the first four or five "nights" he lost the vessel he was pursuing, but found it without any great difficulty upon awakening. Thereafter he held it continuously, improving day by day the performance of his apparatus until it could do almost anything except talk.

After that he devoted his time to an intensive study of the general problem be-

fore him. His results were highly unsatisfactory; for in order to solve any problem one must have enough data to set it up, either in actual equations or in logical sequences, and Kinnison found that he did not have enough data. He had altogether too many unknowns and not enough knowns.

The first specific problem was that of getting into the pirate base. Since the searchers of the patrol had not found it, that base must be very well hidden indeed. And hiding anything as large as a base on Aldebaran I, as he remembered it, would be quite a feat in itself. He had been in that system only once, but——

Alone in his ship, and in deep space although he was, he blushed painfully as he remembered what had happened to him during that visit. He had chased a couple of dope runners to Aldebaran II, and there he had encountered the most vividly, the most flawlessly, the most remarkably and intriguingly beautiful girl he had ever seen. He had seen beautiful girls and women, of course, before and in plenty. He had seen beauties amateur and professional—social butterflies, dancers, actresses, models, and posturers, both in the flesh and in Telenews plates—but he had never supposed that such an utterly ravishing creature as she was could exist outside of a thionite dream. As a timidly innocent damsel in distress she had been perfect, and if she had held that pose a little longer Kinnison shuddered to think of what might have happened.

But, having known too many dope runners and too few patrolmen, she misjudged entirely, not only the cadet's sentiments, but also his reactions. For, even as she came amorously into his arms, he had known that there was something screwy. Women like that did not play that kind of game for nothing. She must be mixed up with the two he had been chasing. He got away from her, with only a couple of scratches, just in time to capture her confederates as they were making their escape. He had been afraid of beautiful women ever since. He'd like to see that Aldebaranian hell-cat again—just once. He'd been just a kid then, but now——

BUT that line of thought was getting him nowhere, fast. It was Aldebaran I that he had better be thinking of: barren, lifeless, desolate, airless, waterless; bare as his hand, covered with extinct volcanoes, cratered, jagged, and torn. To hide a base on that planet would take plenty of doing, and, conversely, it would be correspondingingly difficult of approach. If on the surface at all, which he doubted very strongly, it would be covered.

In any event, all its approaches would be thoroughly screened and equipped with lookouts on the ultra-violet and on the infra-red, as well as on the visible. His detector nullifier wouldn't help him much there. Those screens and lookouts were bad—very, very bad. Question: could *anything* get into that base without setting off an alarm?

His speedster could not even get close; that was certain. Could he, alone? He would have to wear armor, of course, to hold his air, and it would radiate. Not necessarily—he could land out of range and walk, without power; but there were still the screens and the lookouts. If the pirates were on their toes it simply wasn't in the cards; and he had to assume that they would be alert.

What, then, could pass those barriers? Prolonged consideration of every facet of the situation gave definite answer and marked out clearly the course he must take. Something admitted by the pirates themselves was the only thing that could get in. The vessel ahead of his was going in. Therefore, he must and would enter that base within the pirate vessel itself. With that point decided there remained only the working out of a

method, which proved to be almost ridiculously simple.

Once inside the base, what should he —or rather, what *could* he—do? For days he made and discarded plans, but finally he tossed them all out of his mind. So much depended upon the location of the base, its personnel, its arrangement, and its routine, that he could develop not even the rough draft of a working plan. He knew what he wanted to do, but he had not even the remotest idea as to how he could go about doing it. Of the opening that appeared, he would have to choose the most feasible and fit his actions to whatever situation then and there obtained.

So deciding, he shot his spy ray toward the planet and studied it with care. It was, indeed, as he had remembered it —or worse. Bleakly, hotly arid, it had no soil whatever, its entire surface being composed of igneous rock, lava, and pumice. Stupendous ranges of mountains crisscrossed and intersected each other at random, each range a succession of dead volcanic peaks and blown-off craters. Mountainside and rocky plain, crater wall and valley floor, alike and innumerably were pock-marked with subcraters and with immensely yawning shell holes, as though the whole planet had been, throughout geologic ages, the target of an incessant cosmic bombardment.

OVER its surface and through and through its volume he drove his spy ray, finding nothing. He bored into its substance with his detectors and his tracers, with results completely negative. Of course, closer up, his electromagnetics would report iron—plenty of it—but that information would also be meaningless. Practically all planets had iron cores.

As far as his instruments could tell—and he had given Aldebaran I a more thorough going over, by far, than any ordinary surveying ship would have given it—there was no base of any kind upon or within the planet. Yet he ***knew*** that a base was there. So what? So—maybe—Helmuth's base might be inside the galaxy after all, protected from detection in the same way, probably by solid miles of iron or of iron ore. A second line upon that base had now become imperative. But they were approaching the system fast; he had better get ready.

He belted on his personal equipment, including a nullifier, then inspected his armor, checking its supplies and apparatus carefully before he hooked it ready to his hand. Glancing into the plate, he noted with approval that his chaser was functioning perfectly. Pursued and pursuer were now both well inside the solar system of Aldebaran; and, as slowed the pirate, so slowed the speedster.

Finally, the leader went inert in preparation for his spiral. But Kinnison was no longer following. Before he went inert he flashed down to within fifty thousand miles of the planet's forbidding surface. He then cut his Bergenholm, threw the speedster into an almost circular orbit, well away from the landing orbit selected by the pirate, cut off all his power, and drifted. He stayed in the speedster, observing and computing, until he had so exactly defined its path that he could find it unerringly at any future instant. Then he went into the air lock, stepped out into space, and, waiting only to be sure that the portal had snapped shut behind him, set his course toward the pirate's spiral.

Inert now, his progress was so slow as to seem imperceptible, but he had plenty of time. And it was only relatively that his speed was low. He was actually hurtling through space at the rate of well over two thousand miles an hour, and his powerful little driver was increasing that speed constantly by an acceleration of two Earth gravities.

Soon the vessel crept up, beneath him now, and Kinnison, increasing his drive

to five gravities, shot toward it in a long, slanting dive. This was the most ticklish minute of the trip, but the Lensman had assumed correctly that the officers of the badly undermanned ship would be looking ahead of them and down, not backward and up. They were, and he made his approach unseen. The approach itself, the boarding of an inert space ship at its frightful landing-spiral velocity, was elementary to any competent space man—simplicity itself. There was not even a flare to bother him or to reveal him to sight, as the braking jets were now doing all the work. Matching course and velocity ever more closely, he crept up—flung his magnet—pulled up, hand over hand—opened the emergency inlet lock—and there he was.

UNCONCERNEDLY, he made his way along the sternway and into the now deserted quarters of the fighters. There he lay down in a hammock, snapped the acceleration straps, and shot his spy ray into the control room. And there, in the pirate captain's own visiplate, he observed the rugged and torn topography of the terrain below, as the pilot fought his ship down, mile by mile.

Tough going, this, Kinnison reflected, and the bird was doing a nice job, even if he was taking it the hard way, bringing her down straight on her nose instead of taking one more spiral around the planet and then sliding in on her under jets, which were designed and placed specifically for such work. But taking it the hard way he was, and his vessel was bucking, kicking, bouncing, and spinning on the terrific blast from her braking jets. Down she came, fast; and it was only after she was actually inside one of those stupendous craters, well below the level of its rim, that the pilot flattened her out and assumed normal landing position.

They were still going too fast, Kinnison thought. But the pirate pilot knew what he was doing. Five miles the vessel dropped, straight down that Titanic shaft, before the bottom was reached. The shaft's wall was studded with windows; in front of the craft loomed the outer gate of a gigantic air lock. It opened; the ship was trundled inside, landing cradle and all, and the massive gate closed behind it. This was the pirates' base, and Kinnison was inside it!

"Men, attention!" The pirate commander snapped then. "This air is deadly poison, so put on your armor and be sure your tanks are full. They have rooms for us, having good air, but don't open your suits a crack until I tell you to. Assemble! All of you that are not here in this control room in five minutes will stay on board and take your own chances!"

Kinnison decided instantly to assemble with the crew. He could do nothing in the ship, and it would be inspected, of course. He had plenty of air, but space armor all looked alike, and his Lens would warn him in time of any unfriendly or suspicious thought. He had better go. If they called a roll—— But he would cross that bridge when he came to it.

No roll was called; in fact, the captain paid no attention at all to his men. They could come along or not, just as they pleased. But since to stay in the ship meant death, every man was prompt. At the expiration of the five minutes the captain strode away, followed by the crowd. Through a doorway, left turn, and the captain was met by a creature whose shape Kinnison could not make out. A pause, a straggling forward, then a right turn.

Kinnison decided that he would not take that turn. He would stay here, close to the shaft—where he could blast his way out if necessary—until he had studied the whole base thoroughly enough to map out a plan of campaign. He soon found an empty and appar-

ently unused room, and assured himself that through its heavy, crystal-clear window he could indeed look out into the vastly cylindrical emptiness of the volcanic shaft.

THEN, with his spy ray, he watched the pirates as they were escorted to the quarters prepared for them. Those might have been rooms of state, but it looked to Kinnison very much as though his former shipmates were being jailed ignominiously, and he was glad that he had taken leave of them. Shooting his ray here and there throughout the structure, he finally found what he was looking for: the communicator room. That room was fairly well lighted, and at what he saw there his jaw dropped in sheerest amazement.

He had expected to see men, since Aldebaran II, the only inhabited planet in the system, had been colonized from Tellus and its people were as truly human and Caucasian as those of Chicago or of Paris. But these—these *things* —— He had been around quite a bit, but he had never seen nor heard of their like. They were wheels, really. When they went anywhere they rolled. Heads where hubs ought to be—eyes—arms, dozens of them, and very capable-looking hands——

"Vogenar!" a crisp thought flashed from one of the peculiar entities to another, impinging also upon Kinnison's Lens. "Some one—some outsider—is looking at me. Relieve me while I abate this intolerable nuisance."

"One of those creatures from Tellus? We will teach them very shortly that such intrusion is not to be borne for an instant."

"No, it is not one of them. The touch is similar, but the tone is entirely different. Nor could it be one of them, for not one of them is equipped with the instrument which is such a clumsy substitute for the sense of perception with which all really intelligent races are endowed in their minds. There, I will now begin to——"

Kinnison snapped on his thought screen, but the damage had already been done.

In the violated communications room the angry observer went on: "—attune myself and trace the origin of that prying look. It has disappeared now, but its sender cannot be distant, since our walls are shielded and screened. Ah, there is a blank space which I cannot penetrate, in the seventh room of the fourth corridor. In all probability it is one of our guests, hiding now behind a thought screen." Then his orders boomed out to a corps of guards. "Take him and put him with the others!"

Kinnison had not heard the order, but he was ready for anything, and those who came to take him found that it was easier far to issue such orders than to carry them out.

"Halt!" snapped the Lensman, his Lens carrying the crackling command deep into the wheelmen's minds. "I do not wish to harm you, but come no closer!"

"You? Harm us?" came a cold, clear thought, and the creatures vanished. But not for long. They, or others like them, were back in moments, this time armed and armored for strife.

Again Kinnison found that rays were useless. The armor of the foe-mounted generators as capable as his own; and, although the air in the room soon became one intolerably glaring field of force, in which the very walls themselves began to crumble and to vaporize, neither he nor his attackers were harmed. Again, then, the Lensman had recourse to his medieval weapon, sheathing his DeLameter and wading in with his ax. Although not a VanBuskirk, he was, for an Earthman, of unusual strength, skill, and speed; and to those opposing him he was a very Hercules.

THEREFORE, as he struck and struck and struck again, the cell became a gorily reeking slaughter pen, its every corner high-piled with the shattered corpses of the wheelmen and its floor running with blood and slime. The last few of the attackers, unwilling to face longer that irresistible steel, wheeled away, and Kinnison thought flashingly of what he should do next.

This trip was a bust so far. He couldn't do himself a bit of good here now, and he'd better buzz off while he was still in one piece. How? The door? No. Couldn't make it. He'd run out of time quick that way. Better take out the wall. That would give those Wheelmen something else to think about, too, while he was doing his flit.

Only a fraction of a second was taken up by these thoughts; then Kinnison was at the wall. He set his DeLameter to minimum aperture and at maximum blast, to throw a cutting pencil against which no material substance could stand. Through the wall that pencil pierced—up, over, and around.

But, fast as the Lensman had acted, he was still too late. There came trundling into the room behind him, upon four low wheels, a truck, bearing a squat and monstrous mechanism. Kinnison whirled to face it. As he turned the section of the wall upon which he had been at work blew outward with a deafening crash. The ensuing rush of escaping atmosphere picked the Lensman up as though he had been a straw and hurled him out through the opening and into the shaft. In the meantime the mechanism upon the truck had begun a staccato, grinding roar, and as it roared Kinnison felt slugs ripping through his armor and tearing through his flesh, each as crushing, crunching, paralyzing a blow as though it had been inflicted by VanBuskirk's space ax.

This was the first time that Kinnison had ever been really badly wounded, and it made him sick. But, sick and numb, senses reeling at the shock to his slug-torn body, his right hand flashed to the external controller of his neutralizer. For he was falling inert. It was only ten or fifteen meters to the bottom, as he remembered it. He had mighty little time to waste if he were not to land inert. He snapped the controller. Nothing happened. Something had been shot away. His driver, too, was dead. Snapping the sleeve of his armor into its clamps he began to withdraw his arm in order to operate the internal controls, but he ran out of time. He crashed, on the top of a subsiding pile of masonry which had preceded him, but which had not yet attained a state of equilibrium, underneath a shower of similar material which rebounded from his armor in a boiler-shop clangor of noise.

Well it was that that heap of masonry had not yet had time to settle into form, for in some slight measure it acted as a cushion to break the Lensman's fall. But an inert fall of forty feet, even cushioned by rocks, is in no sense a light one. Kinnison crashed. It seemed as though a thousand pile drivers struck him at once. Surges of almost unbearable agony swept over him, as bones snapped and bruised flesh gave way. He knew dimly that a merciful tide of oblivion was reaching up to engulf his shrieking, suffering mind.

But, foggily at first in the stunned confusion of his entire being, something stirred, that unknown and unknowable something, that indefinable ultimate quality that had made him worthy of the Lens he wore. He lived, and while a Lensman lived he did not quit. To quit was to die then and there, since he was losing air fast. He had plastic in his kit, of course, and the holes were small. He *must* plug those leaks, and plug them quick.

His left arm, he found, he could not move at all. It must be smashed pretty badly. Every shallow breath was a

searing pain. That meant a rib or two gone out. Luckily, however, he was not breathing blood; therefore, his lungs must still be intact. He could move his right arm, although it seemed like a lump of clay or a limb belonging to some one else.

But, mustering all his power of will, he made it move. He dragged it out of the armor's clamped sleeve, forced the leaden hand to slide through the welter of blood that seemed almost to fill the bulge of his armor. He found his kit box, and, after an eternity of pain-racked time, he compelled his sluggish hand to open it and to take out the plastic.

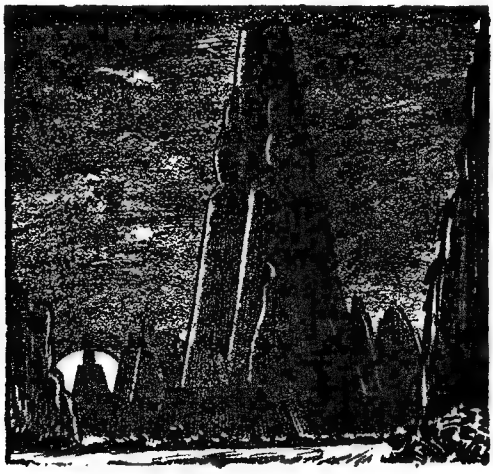
THEN, in a continuously crescendo throbbing of agony, he forced his maimed, crushed, and broken body to writhe and to wriggle about, so that his one sound hand could find and stop the holes through which his precious air was whistling out and away. Find them he did, and quickly, and sealed them tight; but when he had plugged the last one he slumped down, spent and exhausted. He did not hurt so much, now; his suffering had mounted to such terrific heights of intolerable keenness that the nerves themselves, in outraged protest at carrying such a load, had blocked it off.

There was much more to do, but he simply could not do it without a rest. Even his iron will could not drive his tortured muscles to any further effort until after they had been allowed to recuperate a little from what they had gone through.

How much air did he have left, if any, he wondered, foggily and with an entirely detached and disinterested impersonalness. Maybe his tanks were empty. Of course, it couldn't have taken him as long to plug those leaks as it had seemed to, or he wouldn't have had any air left at all, in tanks or suit. He couldn't, however, have much left. He would look at his gauges and see.

But now he found that he could not move even his eyeballs, so deep was the coma that was enveloping him. Away off somewhere there was a billowing expanse of blackness, utterly heavenly in its deep, softly-cushioned comfort; and from that sea of peace and surcease there came reaching to embrace him huge, soft, tender arms. Why suffer, something crooned at him. It was *so* much easier to let go!

TO BE CONTINUED.



SPACE SIGNALS

A robot—dismantling a machine—putting it together again—over and over——

by A. B. L. Macfadyen, Jr.

PETER FINE ate his dinner hurriedly that evening, and his impatient reading of the newspapers was confined to a single item whose heading took his eyes. It read:

> Archæological circles were reported amazed and incredulous, Friday, regarding Dr. O. O. Sylvester's alleged discovery of the fossils of giant prehistoric men in the glacial deposits of the Black Hills, South Dakota. Corresponding to many-armed figures of Hindu mythology, these skeletons, Dr. Sylvester claimed, possessed an extra arm sprouting from the torso on each side of the waist, rendering them six-limbed. Dr. Sylvester said he found an indefinite number of the strange fossils, crushed as though by some great weight, in a single locality, and believed that the remains were from fifteen to twenty thousand years old——

Fine chuckled. He didn't believe it, either. He rose from the table and ran up the stairs to his workshop.

On a long, wooden bench, a cubical box of thick glass, three feet on an edge, held a peculiar assembly of radio apparatus. There were innumerable electron tubes no larger than a man's thumb, and the whole set-up was mounted on struts and panels of milky quartz. Fine rapped the case with a thumb nail, and smiled at the peculiar ring of the glass. He had evacuated the case on the previous evening. It was the first radio receiver to be built in a vacuum.

It was also, probably, the first to operate reliably on wave lengths below a tenth of a centimeter—those quasioptical waves capable of piercing the Heaviside layer. Leakage had been the insurmountable problem. Current-carrying wires had charged near-by air molecules, and the ever-faint signals had leaked away. He had solved it by removing the air.

Fine chuckled, and murmured, "Oh, very clever, very clever. All I need now is somebody to listen to!" For, of course, only a few experimenters used the decimeter bands. His next task would be the construction of a decimeter transmitter, and a parabolic antenna.

He looked at the sparkling glass and aluminum, the peanut tubes, the specially-built condensers, the copper tubing conductors, and then he murmured, "Shoot a little juice into her, anyway and——"

He closed a switch, and the rotary converter under the bench began its faint hum. Direct current flowed along the cables sealed into the glass case. The tubes, with their cylindrical anodes and straight wire filaments, glowed slightly. He plugged in a pair of headphones to the panel. Then he adjusted the slow-motion dials, advanced the super-regeneration.

It happened so suddenly, and yet so naturally, that a subtle chill flicked down his backbone. A *voice*—a series of strange, clattering syllables, repeated over and over, with a questioning note to them! For a minute he could not think clearly, and his hand trembled slightly on the dial. The voice slipped away, and was replaced by an intermittent, high-pitched whine, like a badly adjusted transmitter. He switched the



Fine tried to get up, but it was too late—— The crypt vanished—starshine flashed and blurred in speed.

voice back, then the whine, then the voice. The whine sounded like television signals.

FINE rubbed his nose thoughtfully, then crossed to his ten-meter transmitter. By day he was chief engineer of a commercial station. By night, driven by the fascination which radio had had for him for most of his thirty years, he was an amateur. He sat down, threw on another converter, and shortly was talking

in the strange slang of the ham with an amateur in Germany.

He conversed for ten minutes, but Johann—he did not know the German's last name—could help in only a negative way. No decimeter transmitters were then sending. Of course, it might be a secret transmitter, unlicensed. But that, Fine agreed, was not likely. He switched to half a dozen operators in different parts of the world, picking from his vast acquaintanceship those who kept in touch with the experimenters; but, as he had somehow expected, they were unable to help him.

He snapped off his transmitter, stepped to the decimeter receiver. For two minutes he heard nothing; then the clattering syllables began again. Probably it was a record. The tone never varied. He hauled a chair over, sat down with the strange voice in his ears, and considered. He had already designed a decimeter transmitter, but since the unknown sender did not use the regular calls, his own would probably be unintelligible. Or would they? How could you contact a man who spoke an utterly alien language, who did not use International Code, nor the standard calls?

Television.

Peter Fine sat up. He could do that. He could adapt his Zworykin kinescope to the decimeter receiver, instead of the five-meter set. The kinescope converted electrical impulses to images, and would operate on the shorter wave lengths with a few changes in transformers and better shielding.

He *would* do that. Hastily, he grabbed paper and pen, began to figure inductances, capacities, and reactances, then tore into the task, knocking off at five o'clock in the morning for two hours' sleep before he went to work at the station.

On the following evening he left his car outside his house instead of putting it in the garage, gulped his dinner, disregarding the protestations of his housekeeper and his cook, ran upstairs, and began to work furiously again. By eleven o'clock he was finished.

He had sealed his kinescope—which forms the receiving end of television—with all its amplifiers, into another glass case, bringing the controls outside. The kinescope was a conical, long-necked, evacuated tube, and the images formed on its six-inch, flat, large end. Electrons emitted from a hot filament sped out of the long neck, impinging on the prepared surface of the flat end in innumerable tiny flashes of fluorescence. The flashes waxed and waned with the incoming impulses, forming images in a mass effect.

Peter Fine drew a handkerchief across his forehead and opened a window. The ghosts were whispering in the trees, talking with the night wind. Starshine looked down, and Fine looked up at the stars, with a stray thought pushing at the portals of his brain. Then he went back to the bench and snapped on the decimeter set, connected up the kinescope.

The strange voice came again to his ears; he moved down to get the whine, and began to adjust the kinescope. Stray blobs of black danced across the white of the big aluminum screen. Shadows hovered. Images struggled to establish themselves.

Abruptly, without flicker and with greater detail than the eye could appreciate, there was a picture there. But it was a scene out of a nightmare. Peter Fine said, "Good Lord!" and stared at the mad, moving, glittering, gesticulating figure.

Its flexible lips were mouthing soundless words; its enormous, misshapen head was turning from side to side, and the six fingers at the ends of its four arms were dismantling a huge, alien device of crystal rods and metal electrodes. The whole scene was like some ghastly mimicking of a demonstrating

salesman. Fine stared in utter bewilderment, until the significance of the stiff motions, the unvarying expression, and the mechanical repetition came to him.

A robot, dismantling a machine!

IT WAS MAD, senseless. The low bench in front was strewn with parts. The high, massive figure waved all its arms for a minute, talking noiselessly. Fine twitched the controls, picked up its clattering, metallic syllables. He turned back to the scene in time to see it pick up an affair that looked like a headset, attach another part, wave hands, talk volubly, then pick up another. In five minutes, the device was whole again.

More talk. Then it took the machine apart once more; then built it up; then took it down. Then——

But after fifteen minutes of this, Peter Fine collapsed into his chair. He roused after a while to record the whole process of the robot on a small motion-picture camera. It was well he did this. At half past twelve the screen dimmed and died, held only the flickering shadows of the blank tube. The voice, too, was gone.

Weary and puzzled, Fine went to bed He could not think.

It was at work next day while he was testing a bank of oscillators—huge, water-cooled tubes—that the solution burst like a spark in his brain. A translating machine! Wherever on earth—or in the solar system—the robot was, its builder had perceived the language difficulty. It was a perfect solution. Fine had only to build a duplicate of the device the robot so patiently took apart for his inspection. Almost certainly, it would translate the clattering tongue into English, although he did not entirely understand how it would do it.

That evening he got a ticket for passing three red lights, and his meal was even more hurried. In the laboratory again, he ran the film of the disturbing scene he had viewed the night before. He studied the strange device. Yes, there was the headset, and something that might be a microphone. But what was the meaning of the dozen twin electrodes, that apparently were to be fastened to the limbs of whoever wore the metal harness? These electrodes, obviously of copper alloy, were like small cones, cup-sized. Leads ran from them to the headset and to the seven small electron tubes mounted above the headset. It was peculiar.

But, anyway, he would build a duplicate. Fine reached for paper and pen, began to sketch circuits and tube details.

It was difficult work. He wished with all his heart he could lay his expert fingers on the thing. Curious the amount of knowledge that resides in the hands, not the eyes. Toward midnight he switched on the kinescope, studied the real images of the eternally demonstrating robot.

At one o'clock he went to bed.

HE WORKED six hours a night for four days, before his brain had even a working familiarity with the strange mechanism. On the fifth day, the robot, with mindless understanding of his difficulties, took apart the cup-shaped electrodes and displayed the elements which formed their alloy. The bewildering figure laid out five blocks on the low bench. Fine clearly recognized copper, aluminum, magnesium, silver and silicon. From the relative sizes of the blocks Fine deduced their proportions in the alloy.

On the following evening the robot disassembled the intricate headset for his inspection, and on the third evening it produced one of the electron tubes minus its glass envelope, and proceeded to remove the electrodes one by one, holding each up in one of its hideous hands and rotating it so that he could see every detail. He subsequently found

that on five nights in every thirteen the robot went through this detailed analysis, afterward going back to its old routine.

A month later his duplicate was finished. Hours of painstaking toil were behind him. There had been long nights of study, and short hours of sleep broken by dreams infested with spinning electrochemical symbols, calculus signs, metallurgical data, and half a dozen fragments of other sciences; there had been long impatient delays while instrument makers in New York built according to his improbable specifications.

So, now, it was with excitement throbbing in his brain that Fine carefully adjusted the light aluminum framework that carried all the apparatus on his back. Then he strapped the dozen twin electrodes to various parts of his body. He strapped the heavy, tube-surmounted headset to his skull, tightened what he thought was a microphone to his chest, and wriggled about till he was comfortable.

The tubes puzzled him. The oscillograph—whose cathode ray tube made wave patterns visible—had shown that they were oscillators, not amplifiers. And the wave form they generated, though sinusoidal, resembled nothing he had seen before.

But he shrugged, strapped the air-cell batteries to his waist—as if, he thought, he was going somewhere—and plugged an attachment into the phone jack on the decimeter wave receiver, which was humming faintly. The robot was talking from the speaker, but Fine had a rising, sickening sensation of failure, as he adjusted the six variometers on the panel of his harness.

After fifteen minutes, nothing had happened.

He tried for ten minutes more, but the clattering syllables of the robot did not change, in his headset, into English words and phrases. Fine was more disappointed than he had ever been in his life. He muttered, "Damn the fellow. I guess it was too much to expect. This can't be a perfect duplicate. Aw, to hell with him!" And he yanked the phone plugs viciously from his receiver.

INSTANTLY, like bat wings shutting out the light, darkness closed about him and a gigantic voice roared indistinguishable words in his ears. There was an instant when he seemed to be torn this way and that, a moment of strange reversals, and new, unnamable directions, when he felt as though he were whirling in a great void. Dim points like stars and comets, blurred by rising heat waves, swung madly about his eyes, and there was a fleeting vision of a great globe in one direction shrinking into itself and vanishing like a dream. He was weightless and mindless. The split second closed with the vision of another titanic sphere that swelled and swallowed him up like a dust mote falling into the sun.

Peter Fine lay for a long time on a hard surface, and waited while the bright lights stopped spinning in his eyeballs. But there was some sort of electrical convulsion jerking at his limbs, and instinctively he felt up through the haze and snapped off the current from the batteries.

He opened his eyes to a scene from hell.

He lay flat on a twenty-foot copper disk set into the black granite floor of a vast cavern, whose limitless roof was lost somewhere up beyond the single, red-glowing sphere which formed the only illumination. The red light waxed and waned, like furnace fires, and the fitful gleam swept over the mad, glittering, gesticulating figure that stood some sixty feet from where he lay.

It was the robot.

Fine stared at the great twenty-foot figure whose sounding voice was rumbling and reverberating all through the enormous cavern, then sat up, slowly, shakily. He muttered "A translator—

yes. But it translates from place to place not language to language." Then, softly, "Damn the fellow!" He had not expected nor had he wanted anything like this.

He got up, removed the harness, and walked toward the robot. He stood close and watched it go through all the motions so familiar to him from long study of his kinescope. His kinescope—on Earth.

Where was this?

The sight of the mindless enormous robot had in it something horrible and unnerving. Fine wondered how long it had been going on like this, and turned, yelled into the silence, "Hey! Anybody here?"

An echo rushed back from the walls: "Anybody here!" And again, "—body —here——" Faintly it sighed, "Here ——" And silence fell again.

Peter Fine put out a tentative hand, touched the shining metal of the robot's thigh, above his head. Tremendous power was here. The thing might go on forever. He looked up at its shouting lips, then turned to examine the television scanner mounted on a great high tripod in front of the low bench.

Then he turned away and walked through the flickering reddish gloom into the distance, where the walls must be. Probably the light was dying. Perhaps the robot had been shouting its alien syllables for numberless years. Perhaps for but a little while. Perhaps its master had left it in his absence only a month or so before. And robots were invariably made in the image of their maker.

AFTER A WHILE he saw dim walls rearing mistily into the heightless spades above, and twenty minutes later his outstretched hand touched the glass-smooth rock. But he walked for half an hour around the great curve of the wall before finding the open black mouth of a tunnel.

He stepped into it, and after fifteen minutes of steady walking—everything here was on the largest scale—perceived that a wide beam of white light laced the darkness ahead, from one side of the tunnel to the other, high as his head. Coming closer he put his hand tentatively in the beam.

Instantly, a streak of light, low down, appeared a hundred feet away, widening into an oblong. The oblong expanded into a great tall slit, as a door built like a flood gate lifted up into the roof of the tunnel.

Peter Fine stepped through.

He was then on the beginning of a great green road sweeping down and around the curve of a mountain's shoulder. Beyond was a flat plain, red with sand and green with masses of low vegetation, spreading endlessly under a blue-violet sky, faintly dusted with daylight stars. The green road appeared lower down the mountain again, and stretched from the foothills arrow straight across the flat, crystal-clear plain. On all the other sides were the mountains—standing up like sharks' teeth.

Fine's legs were suddenly unsteady. He groaned, faintly, "Damn the fellow," and then turned to look at the tunnel mouth. But the door had descended silently. Only the bare rock, sweeping up into the crags, was there now.

So he trudged on down the road, to see what was beyond the bend. On one hand was the steep rock wall—on the other a sheer drop into a mile-deep abyss. He felt light, buoyant, clear-headed. He frowned, and thought slowly and distinctly, "Now, the robot was left to get in touch with some one. That happened to be me. I was to build the machine. It, with the stuff in the cavern, brought me here. The question is, why?"

He could think of no answer.

He arrived at the curve of the road, and, suddenly, was hearing the loudening patter of running feet. Some one—

or two—was coming around the bend. Cautiously, he stepped into a deep cleft in the towering rampart on the left side of the road, and waited.

A gray-haired man and a girl, running heavily, came panting around the bend. Fine's heart missed a beat. But as he was about to hail them, a short, narrow vehicle suspended between two huge wheels came purring around after them. Both threw a desperate glance ahead, then back, and then apparently gave up the idea of further flight.

A door slid open, and two creatures whom Fine at first took for human beings stepped out and advanced on the first two. There was menace and meaning in their slow movements, and Fine stooped, picked up a rock shard as long as his forearm. He had no idea what it was all about, but he was on the side of the first two.

He slipped off his shoes and ran silently over the fifty feet separating him from the quartet. He came up behind, in a second, and swung the club twice. He meant only to stun, but the hairless, fish-headed skulls of the pair were as fragile as blown eggshells.

WHEN it was done he leaned against the car, sick, and stared at the blue-violet blood forming two pools on the green road, as the gray-haired man leaped forward. Man and girl, and Fine, stared at each other in mutual wonder and perplexity. The solution dawned simultaneously.

"By thunder," said the gray-haired man, calm German eyes gleaming, "there was no reason why others on Earth might not have picked up those signals! Right?"

"Right," said Fine, dully. He asked, "What is it all about?"

"Ah," said the German, waving a hand, "I was hoping you would know! But thank you. They were going to kill us. I am George Kirschner, and this is Marian Seward, who was one of my assistants on Earth. Have you been here long? Can we get into the cavern?"

"I'm Peter Fine," said Fine, gravely, "and I have only just arrived. We can't get into the cavern. Did you arrive there, too? And what planet is this?"

"Yes, to the first question," said Kirschner, apparently undisturbed by the broken things on the road. "And to the second question, Mars. We have been here exactly a week, I think. Right, Marian?"

The girl smiled gravely at Fine. "A week come Michaelmas," she said.

Fine roused himself. He looked at the sweep of the black mountains, at the long road across the plain, at the graceful car. All this was like an unreal dream. Nothing made sense. He said, wearily, "Well, what is this all about? How are we going to get home? Why are we here?"

Kirschner looked into the closed car, began to poke around curiously. His voice came through the open door: "One thing at a time, my friend. Since we cannot get into the cavern, let us go somewhere else. Hop in!"

There was room for all three of them in the front seat. Fine looked out at the two motionless bodies, and thought they looked more fishlike than ever. Kirschner was stabbing glittering buttons on the small control panel, his eyes noting everything. Abruptly, they began to slide backward, at a disturbing speed. The German pushed another button. They went forward at the same speed. He murmured, "Well, then, let us go down backward, if we must!"

Turning his head, he stared down the winding mountain road, fingers on the wheel. The road slid past; the place of the cavern vanished as they rounded the bend, and the green ribbon wound and shrank into the distance as they sped down through the foothills on to the plain. Kirschner stopped on the plain.

"Now, the question is," he said, lighting a cigarette, "what shall we do? We ourselves came here a week ago, my friend, pulled and fooled by that confounded robot. When the cavern closed us out we followed this road across the plain. That landed us in a city full of those half fishes you saved us from. We were taken, and we thought they were going to kill us, so we tried to escape back to the cavern, hoping to get a return ticket to Earth. So there's no use following this road."

"Why did the robot bring us here?" asked Fine.

"Whatever it was," Kirschner answered, "it doesn't much matter now. Remember the light in the cavern? It was radium-driven, and I had a small spectroscope in my pocket. There was a lot of lead in that lamp. Heaven knows how long it had been burning."

Fine whistled softly. That was a mess. The robot had indeed been going through its antics for incalculable years, then. He said, "Maybe they just forgot about it. Maybe the builders have descendants, somewhere. At any rate, anything, probably, is better than those fish men, or men fish. I suggest we go and look for the descendants. Take off across the desert, curve beyond the mountains. We should hit another road, sometime."

There was a short silence. Kirschner muttered, "There is nothing else, apparently," and swung the car off the road. The sand was loose, but the huge, soft, wide tires were obviously designed for this sort of work. Skirting the mountains, they flashed across the desert. Wind sang its song of speed over the smooth outer skin. The massed mountains swung to the right, and after two hours of breath-taking speed they picked up another road. It curved down from the mountains, dwindled across the plain.

"Let's go up it," said Marian Seward, suddenly. "Maybe there's another cavern at the top."

Kirschner nodded, swung the car.

THERE WAS another cavern. But it was open, and when they drove into its echoing vastness, and swung the car's light around it, they saw that it had been stripped of all machines. Its light was vanishingly dim.

Back on the road again, the car whined across the bare plain. The green road was amazingly wide, and it occurred to Fine that the threadlike markings on Lowell's drawings of the Red Planet might have been networks of these roads, not canals, as Lowell had thought.

"If we reach a city," Marian Seward said suddenly, "it will probably be like the other."

"Such a helpful one," muttered Kirschner, staring ahead.

"What," asked Fine, "was it like?"

"It was hideous," said the girl quietly.

"Yes, it is so," said Kirschner. "Like coral caves filled with octopi."

"This one is different," said Fine, some time later.

"This one," said Fine, "is something like the topless towers of Ilium." He stared at the fairy vision, and whispered, "Heightless, tapered towers like rings piled on each other, spires connected by flying arches like gossamer, obelisk buildings—they catch the sun like hollowed ice crystals, misty as frost drawings on a windowpane."

"You look, Marian," said Kirschner. "Mr. Fine is suffering from hunger."

Fine surrendered the instrument but when the girl looked, she said nothing. Fine said, "Fishes never built it."

"No," said Marian, "fishes never built it."

AN HOUR LATER they were driving through the heart of it and thinking it a city of the dead. On every hand the dream towers and spires laced their intricate tracery against the dying sun. As

Fine had said, the buildings were linked many times with innumerable flying arches and skyways and monorail cables. But it was empty and silent in the dusk.

It was empty until they were well within, driving slowly past the greatest building—a vast palace topped with minarets. Then the great square seemed to suddenly fill with thousands of the fish men.

Kirschner muttered a German oath, and advanced the speed control. But the engine suddenly died. They could only sit there, helpless, while the nightmarish throng pressed hard on all sides.

"Here comes something," said Marian, looking out one side.

A lane had opened. A squadron of guards marched up. The leader motioned them out.

"Nothing else we can do, much," said Kirschner, gloomily. "We could kill a dozen, maybe, but there would be other dozens. Come."

They went out. The squadron closed in, and the crowds hissed high-pitched syllables as they were marched away across the mile-wide square, in through the carved arches of the tremendous palace. They trudged along corridor after high, vaulted corridor, each illuminated by its own glowing walls. Inset in the walls, bright with their glow, were mile after mile of scenes in mosaic. Fine noticed, without much interest, that the living figures in these resembled the six-limbed robot more than the fish men.

Eventually they came into a vast, arched hall like the cavern of the robot. In the center was a cube of stone, with a huge alcove like half a sea shell cut into one face. A fish man clad in black sat upon a great sea-green chair within the alcove. He waved one white hand, and peculiar headsets were placed on each of the silent three.

"At last, translating machines," thought Fine sardonically.

"I am Darien," the figure on the throne told them, "ruler of this planet. Are you from the third planet, like the others?"

"We are," said Kirschner, "and it is known that we are here. If harm comes to us, my planet will declare war."

Darien rested his chinless white face on one webbed hand, and contemplated them. "Curious," he remarked. "The last one lied in exactly the same words. I killed him for a day, then read his mind. That is how I know it is a lie. Your planet could not conquer an uninhabited asteroid."

Fine, seeing that threats were useless, said, "We come in peace."

"Ah, peace?" said Darien. "You have killed two of us, already, in the short time that you have been here. The last visitor we had from your green planet massacred no less than fifty-three. Physically, we are weaker. Yes, there have been other visitors, and they all arrived in the same way. We thought we had found and destroyed all the robots made by the Kalis, but apparently not.

Fine said, "We come seeking information, only, in the spirit of science. Who built the robots?"

Darien, face in hand, stared broodingly over their heads, lost in his own thoughts for a while. "The Kalis built the robots," he said, finally condescending to answer. "They built them long ago, when Mars was younger and those whom I rule were still of the sea. The drying of the oceans drove us onto the land. There was war. Even then, we were greater than the Kalis, who resembled yourselves more than us."

"They called for help—the cravens! Yes, they signaled frantically across the void, seeking knowledge of warfare which would give them victory. But the planets did not answer. So, almost wiped out, they left Mars. But they planned to return. They left the robots, crossed space to another planet—which, we do not yet know. The robots were

their gateway back to Mars, and the task they left the robots doing was like a blue print for them, lest they forget how to make the devices. But they have not come back, and steadily we have sought for the caverns, destroyed them."

Fine, trying to think of a way out, asked, "How did they cross space?"

"That," said Darien, "we do not yet know. The Kalis were well learned in the pursuits of peace. They built this city, this palace. It was their capital. Probably they thought that it was beautiful. Bah! They were dreamers, and their works are lower than the weeds of the sea."

He was silent. Fine was thinking desperately of something to say, something that would get them on the other side. Tiny beads of perspiration clung to Kirschner's brow. Marian was still, standing calmly.

Darien stirred, said, "Did you appreciate the manner in which the citizens hid until you were well within the city, beyond hope of escape? A fine example of mass action."

"It was wonderful!" said Kirschner, enthusiastically. "We could do nothing like it on Earth."

Darien's lipless mouth moved. He might have been smiling, cynically. He said, "Since your only desire is for information—not booty, like the other—you must be satisfied. So you have nothing left to live for. To-morrow you will begin dying. Take them away."

In the last glimpse they had of him he was leaning forward, hands supporting face, elbows on knees. His misty eyes had already forgotten them.

"I guess," said Marian, "we were small potatoes to him."

IT WAS hours later. They were together in the huge, empty hall in the crypts below the palace, where they had been confined. Fine and Kirschner walked around. Marian sat on a ledge along a wall, staring up at the glowing light in the depths of the roof. The Martian morning must be close, she thought, and concentrated on repeating mentally all the poetry she knew. This was interrupted by a sudden remark from Fine, standing before a wall mosaic on the other side of the hall.

"Remember those puzzle pictures," he said, voice booming in the empty hall, "that had faces hidden in foliage, and rivers and so on, that you had to look for. Every time I pass this section something looks at me. Come over here."

It was a wall panel some twenty feet square—only one of thousands built everywhere in the palace. The scene—done in mosaic, by the fitting of thousands of fragments of cut gems—was of a landscape at night, with the bright stars burning clearly. Phobos, that tiny moon, hung over the horizon, and in the half light strange creatures like the cavern robot were dancing in great circles about an altar from which luminous smoke rings were rising against the darkness.

"Weird," murmured Marian. "Weirder than Durer, even."

"There's something wrong with it," said Fine.

"Yes," muttered Kirschner. "Yes—— Hah, the moon! It is far too bright."

The moon was like a bright eye in the picture. Fine looked at it from the side. "Hello! It's emitting a ray of light, sharp as a needle!" He put up his hand, intercepting the fine beam.

And, instantly, the whole section dropped into the tile floor. Light burst on them from beyond. They stared astonished into a small round hall, low-ceilinged, with a thirty-foot copper disk set into the floor, and strange, glittering apparatus clustered near a wall.

Fine and Kirschner exchanged lightning glances. The German murmured, "Could it be?" and followed Fine into the secret chamber.

Marian cried, low, "Look! By the machine."

His back to them, a figure some ten feet high sat motionless before one of the shining machines. Fine advanced softly, peered around enough to see that one huge hand clutched a lever switch, then put out a tentative hand. Instantly, the figure crumbled, became a pile of white, calcareous dust on the seat.

"Dust unto dust," murmured Marian. "How long has he been here?"

"Longer than us," said Kirschner, curtly. "Can we close the door? Marian, try and close it while Fine and I determine whether this is what we think it is. Fine, those tubes—like the ones in the headsets, eh?"

"Yes," said Fine, stepping among the machines. "Is there power? Yes—that spherical thing—radium power, like the lights. Let's try it with something." He took off his coat and dropped it on the copper platform, then closed the switch the figure had been holding.

Nothing happened. Silently, the two of them, brows furrowed in thought, began to trace leads and investigate controls.

Fine said, once, "But we don't know which planet they went to."

"Anything," said Kirschner, "is better than staying here."

THERE WAS SILENCE, until Marian said, unsteadily, "I can't get the door shut."

Fine, absorbed, answered, "There's an inner bolt to the door in the big hall. Go and fasten it, then keep trying. A break, here. Got a knife? Thanks."

After a few minutes they tried again. Nothing happened.

Tiny beads of sweat were appearing again on the brows of Kirschner. He straightened. "No, it is no use—we must know how it works, first. How does it work?"

"Fourth dimension?" hazarded Fine. "Atomic dissociation?"

"Why not just pure speed?" suggested Kirschner suddenly. *"Hein?* If a man could get to the moon in a thousandth of a second, would his body have time to burst in the vacuum? Or time to freeze? No, I do not think so. So maybe that is how they did it. You remember brief flashes of stars, when you came? In the fourth dimension you would see nothing. If you were a cloud of atoms you would see nothing. So that——"

Marian, returning from bolting the outer door, cried, "They're coming! I heard them coming."

Kirschner began to work furiously. "The bolt will hold for ten minutes. They will not get here for five. So we have fifteen! Fine, that thing—a generator, eh? Of the force. We do not need to know how, exactly. Check the circuits again."

With hands dampened by sweat, Fine slid under machines on his back, peered up at mazes of bare wires, pulled and tugged at them, hunting for loose connections. He found them, and hammered the soft metal to complete circuits, just as a thunderous booming came in from the hall. He hacked slivers of copper from the platform, to fill gaps caused by the erosion of centuries. Even the science which had left robots to function unceasingly for thousands of years could not conquer the action of oxygen. Kirschner thumped at tubes, muttering when he found soft vacuums, explored the interiors of intricate switches.

Marian, looking up from her task of trying to raise the picture panel into place again, said, "They're burning out the door. I hear the torch hissing."

Kirschner said, "No more?"

Fine, struggling out of the depths of a thing like a linotype, answered, "Not that I can see." His heart was, now and then, beating with a queer double tick.

Marian cried, "They're through!"

Kirschner yelled a great German oath,

threw his weight against Fine, so that he stumbled and fell on the copper platform, and pushed Marian after him. The German looked once through the door of the crypt, saw a great host of the fish men coming pounding across the wide, wide floor, and leaped to the switch. He yanked it down.

Fine tried to get up, but it was too late. The crypt vanished like a dream, stars and starshine flashed for a fraction of time, blurred by the shimmer of their speed; a globe dwindled, and another puffed up like a balloon—a green balloon misted with silver and red. Then darkness for a while, with voices muttering excitedly, becoming clearer and clearer, until Fine, still dazed, heard a man's deep voice calling, "Dr. Sylvester! Dr. Sylvester!"

FINE LOOKED AROUND, and saw instantly that he was in a diggings. Bits of white bone stuck up here and there in the sand pit, and by the rim were half a dozen men in breeches, staring amazed at him and Marian, who was just sitting up by his side. Only then did Fine remember a news story he had read ages since.

"*This* is where they came!" he told Marian excitedly.

"Where is this?" asked the girl, dazed and bewildered.

"The Black Hills of South Dakota! The gravity," said Fine irrelevantly, "must have killed them."

The six archæologists had been listening to this dialogue silently, and now, as a short, tubby man came pounding up, one of them asked politely, "Would you mind telling us how you got here? Is it a stunt? You appeared out of the air a minute ago. How do you do it?"

Marian said suddenly, "Where is Dr. Kirschner? Did he——"

A shadow darkened Fine's face. He said, slowly, "He pulled the switch. He saved us, but not himself. He——"

Without the least warning, a man in torn clothes was suddenly lying at his feet, blinking into existence like a vision. Fine yelled "Kirschner!" and hauled the German to his feet.

"What the devil is happening?" asked the short archæologist. "Where did these three come from? Did you dig them up?"

"They just appeared, Dr. Sylvester," a thin man told him. "About two minutes ago. They dropped out of the sky like manna, and won't tell us how they do it."

Fine, ignoring the archæologist, was shaking Kirschner's shoulder, yelling, "How did you get away? Who threw the switch for you?"

"Not so hard; I am quite all right now," said Kirschner. He smiled at Fine and Marian. "When I closed the switch for you, the chamber door shut, too. That was how to close it. So I left it shut, made a rope out of my shirt, then stood on the disk and operated the switch with the rope. Simple, eh?"

"But how did you get here?" asked Sylvester, exasperated.

Fine looked at Kirschner, lifted his eyebrows. The German shook his head. "You wouldn't believe us," said Fine to Sylvester. "But if you keep digging you'll find a lot more four-armed giants like the goddess Kali. And you might find a copper plate. And maybe some day we'll tell you where they came from."

Arm in arm, the three walked off across the bad lands, in the direction of the distant town.

NOTICE—All stories in Street & Smith's magazines are new. No reprints are ever used.

Angel in the Dust Bowl

An invisible wall of power—through which nothing could penetrate——

by SPENCER LANE



It was still there, still roaring—but it neither advanced nor retreated——

THE YOUNG MAN with the spade beard sat across the desk from the secretary of war. It had taken him a week to unwind the red tape that had brought him face to face with such dignity.

"Well, well, young man," said the secretary, "what is it you wish? I understand you have been very troublesome. I also wish you to understand that I am a very busy man, weighted down with heavy responsibilities."

"I understand, Mr. Secretary," said Elam Fahey. "You have a golfing date, thirty-six holes, with the secretary of agriculture this afternoon. This evening

you attend a ball at the French Embassy. After that you play bridge at an exclusive gathering, where nobody less than a minister plenipotentiary could look inside the door. I know all that, but just the same, I'm here, and I'm here until you hear my story."

The secretary bristled. His lips bulged out as though he were about to explode. "I am always being pestered by cranks——" he began.

"Every great man of history at some time or other has been pestered by cranks," said Elam Fahey, softly. "And the reason that some of them live in history is that they *listened* to a crank or two on occasion. Besides, who is to say who is a crank? Would you say that Guglielmo Marconi was a crank?"

"Well—well, drat it, no! But even he had his moments of aberration, I think. I've read some of his things, and his idealistic treatment of matters that even the veriest laymen know to be impossible——"

"Like the wireless, sir? The world laughed at him when he spoke of it. Did you read a paper by him, some years ago, setting forth what he believed to be the one sure national safeguard against war?"

"No. And I haven't time to listen to theoretical nonsense."

"You'll listen this time, sir. I'll make it as brief as I can. He said that the one way—which was certain to come, when man had harnessed sufficient power by which nations could close their borders against all other borders—was by building invisible walls of power along those borders. Walls of power too high to fly over with the best aircraft known and walls of power that were——"

"Impenetrable, I know. I recall the paper. But what has that to do with your visit? You are not, by any chance, the spirit of Guglielmo Marconi coming here to tell me that such an invisible wall of power has finally been perfected?"

"I am not his spirit. He was a great man, before whose memory I bow in reverence too deep, perhaps, for you to understand. Only this I can say: I have found the secret he hinted at. Its ramifications are amazingly intricate, leading into all sorts of bypaths——"

The secretary of war, his face purple, rose to his feet. His eyes flashed fire. "Sir," he said, "you waste my time with nonsense, with the spluttering of a crank! I shall give instructions that you are not to be admitted again, regardless of your excuse!" He stared steadily at Fahey, as a thought grew in his mind. "I shall also make it my business to warn all other cabinet officers, and the White House, that you are likely to make visits to them. Men like you belong in an asylum."

ELAM FAHEY rose. "But if there *were* an invisible wall of power through which nothing could penetrate——"

"What else could you do with it?" said the secretary, pressing a button.

Elam Fahey grinned, thinking fast. He had failed, so he might as well take it in good faith and really give this old fogy something to talk about.

"Every mountain has a keystone," he said. "I could find that keystone, tear it away with my lines of force, and bring the mountain crashing down. I could fill the skies with rain. I could divert streams. I could cause earthquakes. I could change the tides——"

"And the seasons, I suppose! You are, sir, in the slang of the day, a nut, and a dangerous one for all I know. Look, why don't you go to the secretary of agriculture and show him how to salvage the so-called Dust Bowl of the Middle West? Tell him you can cause mountains to rise from the plains, can gather lakes of water where now cattle and horses and human beings are dying. He will be pleased. It will save an expensive reforestation project that would bilk the taxpayers——"

Fahey had risen to his feet. He looked very stern, serious. "I will see him, Mr. Secretary," he said quietly, "if you will postpone your ban on visits to other cabinet officers to give me a chance——"

The secretary of war looked as though he were about to have apoplexy. He sat down, finally, shaking hands spread out on his desk. "Won't some one," he gasped, "deliver me from this lunatic? I put you an impossible proposition, and you don't even smile as you accept the challenge! Do you think for a moment——

"You ask for mountains, Mr. Secretary; you shall have them. One word before I go. If my walls of force are to be used for peace instead of war, I'll make you a sporting proposition: that when I've proved myself, you consent to come past as many secretaries and office boys to see me as I've had to pass to see you."

"Get out! Get out! Before I lose my temper."

"Watch your blood pressure, Mr. Secretary. In case of war the country would be lost without you!"

Elam Fahey ran his hand over his smooth spade beard, of which he was rather proud. His face was white because it would never tan, no matter how hot the sun, and because for five years he had scarcely spent three hours of a given day outside his laboratory. That that laboratory was on the very edge of the Dust Bowl gave him food for thought. It would certainly be strange if the secretary of war, entirely by accident, had given him a clue to the future security of millions of mankind.

WHEN the summer crawled on, and the rains did not come, those who still survived in the Dust Bowl knew that the fury would be loosed again. They studied the sky for rain. They studied their parched soil and watched it dry, become flaky, turn slowly into dust. They watched their crops—which had escaped the grasshoppers—turn into stubble, bow, bend over, sprawl upon the face of the earth. They saw their wells go dry, their ponds turn into muddy slime, the slime turn into broken mosaics of hard earth—then begin to flake into dust. They heard their cattle begin to bawl for water. They saw their children begin to grow gaunt with lack of life-giving moisture.

For these were the Dust Bowl folk who had no place to go, no place to turn for security. When their fields were gone, they must die—or leave the land they and their pioneer ancestors had fought for.

They looked across vast areas where, relics of last year, the horns of dead cattle glistened in the sun, where they stuck up through dunes of earth which the wind had brought to them from the west. They could see the bent legs of horses that had died. They could see dusty crosses in many old cemeteries, where people last year, and the year before that, had died of tuberculosis caused by breathing endlessly of the dust. And there were thousands of them who wished that they too might sleep beneath the dirty crosses, where all troubles were over.

A car sped along a country road. Its roaring motor could be heard for miles. It stopped at each farmer's gate. Farmers and their wives and children went to those gates, listened to the messenger—who told them that many other messengers were flashing through the countryside, all bearing the tidings that the dust was rising to the skies, many miles to the west, that within a matter of hours it would overwhelm them all again.

"Reverend Hackel says that there is nothing left but to pray. He bids you all go to Demarest, your nearest village, where water and food may hold out for a day or two."

"But what of our live stock?" asked the farmers, hopelessly.

The messengers shrugged. All anybody had ever done in answer to that question, it seemed, was shrug. The cattle must do what they could for themselves. The same with horses, chickens, pigs—every living thing. This time the Dust Bowl was doomed.

Cars, buggies, hacks, wagons, began the exodus, utterly without hope. This time the villages would be buried, or gutted of food and water, or become pestilential mausoleums for the accursed.

But they could all die together, listening to the prayers of the devout. What else was there to do? Nobody bothered to lock his doors. Some of them did not even shut them. Their furniture, pitifully slight in quantity, woefully poor in quality, they took with them—hoping to preserve thus a part of their homes.

The villages were filled with people. Every house was packed to bursting with "neighbors."

And at a certain hour Reverend Hackel gathered the inhabitants and the sojourners of Demarest about him. They met on a great common, or square, which was large enough to hold them all. Reverend Hackel stood on a rough board platform with his back to the west, so that his audience could see beyond his back when they looked at him. For he had selected a text that would give them something to think about—something that would make them furious; that would, for all that, take their minds off their troubles, perhaps even cause their fighting spirit to return. The text was: "As ye sow, so shall ye reap!"

REVEREND HACKEL mounted his platform and mentioned his text. Then he paused for a moment, to let it sink in. White, or dusty, pinched faces lifted up to him—looked over and beyond him to where the wall of oncoming dust might shortly reveal itself. Right after that, day would turn to night—choking, gasping, horrible night—when the dust enveloped town, village and countryside, blotting out the sun, reaching higher into the sky than a plane could fly.

"As ye sow, so shall ye reap! For years now, brothers and sisters, the curse of the dust has been upon us. Why? Because we have sinned! Because we have been greedy. We were not satisfied for the land to give us merely what God intended. We wanted more, and more—and yet more. We robbed the soil of its richness. We sucked it dry of moisture for the crops that would fill our pocketbooks. We cleared our hills and our mountains of timber, and dried up the rains. We plowed the sod that would not blow away, turning it into dust that would. We ourselves may not have sinned, but those before us did. And 'the sins of the fathers shall be visited on the children, even unto the third and fourth generation——'"

Faces sullen with denial looked at Reverend Hackel. These farmers had worked hard all their lives. If they planted too much land to wheat, it was only because they needed every penny that wheat would bring to feed their families. Did they have luxuries? Did any of them have servants, and fleets of cars? Did they make trips to Europe, or around the world? Oh, some few, of course, but for the most part——"

"Lord!" cried a woman. *"It's coming!"*

Even the voice of Reverend Hackel was stilled. He turned on the platform to look into the west. Yes, there it came, yet afar off, but coming fast—a great brown cloud—the soft dust caused by the plows of generations of hard-working farmers. The sound of it was audible now—a vast composite shrieking, as though all the world's banshees, ghosts and leprechauns were crying desperation in the dust. The people had

lived, last year, and the year before, right in the dust—until they breathed it, ate it, slept in it, drank of it—and its sound was part of their living. But, even so, they were awed by its present coming. The sound was greater than ever before. Its height and width were greater than ever before. It was a vast brown mountain range that blocked out the sun, or soon would; that at night would vanquish the moon and the stars, so that for all the days of the wind—which no man could guess at with assurance—none of them could be seen, and people would almost forget that they existed.

"Face it!" cried Reverend Hackel. "Face it, unafraid, and pray. Face it, and beg our God to halt its ghastly advance——"

The Reverend lifted his hands, spread his arms wide—as Moses must have done that day to turn the tide of battle—that day when two of his captains held his arms aloft when he grew weary. And the Reverend Hackel prayed with all his soul.

"O God, grant Thy suffering people a miracle! Make the dust stand still in the sky ere it reaches Thy devout children, as Thy devout follower Joshua bade the sun, and the moon in the Valley of Ajalon. For him Thy didst perform a miracle. This is less by far, and so easy for Thee. Harken to our prayers, O God, and let this curse pass from us. Only hear, we pray Thee——"

The brown mountain came on with the whispers of hell in it, with the breath of the hurricane in it, with death in it for all living things. Cattle raced before it, bellowing. Horses driven mad by it charged through with the cattle. Chickens found their ancient wild ability to fly, in part, and ran a little, and flew a great deal, squawking their dread. Sheep, hogs, raced before the brown mountain, as they would have raced from a forest fire. Rats, mice, coyotes, all the birds and beasts of the field, fled before it at top speed.

But it was faster, and one by one it caught them. They were engulfed, to wander in the heart of the brown mountain until they died.

But Reverend Hackel and his congregation prayed on—prayed for a miracle. Lightning flashed, jagged streaks of it, across the sky from north to south. Thunder rolled.

"God bring us rain to lay the dust!" shrieked Hackel. "Thou are harkening to our prayers. O God, we thank Thee!"

THE CONGREGATION stopped praying. Unbelievingly, it rose to its feet. The hands of the preacher dropped to his sides. For the unbelievable miracle was happening. The brown mountain, by some weird, incomprehensible necromancy, had stopped in its charge across the face of the land. It was still there, still roaring, still reaching to the northern end, and the southern end of the earth. But it did not advance; nor did it retreat. Its sound did not diminish—at least at first.

It simply piled up. It reached the sky, and the earth—and stopped without falling down. Everybody in Hackel's audience knew that the mountain reached for ghastly miles into the west; that the wind still came from there. But it stopped *here*, and it wasn't possible. And streaks of lightning, like a monstrous burning fence, reached back and forth across the face of the storm.

Mouths were open; eyes were bulging, as everybody stared. There was the the wall of dust, close enough almost to touch, close enough certainly to hear as in a nightmare. Yet dust did not trickle into their eyes, their ears, or dirty their faces—and their clothing was as empty of the curse as it had been when they had first heeded the summons of the preacher.

It was impossible, inconceivable, that

the dust had stopped, as though God had indeed worked a miracle for His children.

The horses knew, too, and the cattle. They knew when the terror did not pursue, and they stopped in their tracks and turned, doubtfully, with ears and heads lifted, to stare. The brown mountain had been a tidal wave of dust to engulf them. Now it had been stopped dead.

"It isn't possible!" breathed the preacher.

"It is, my friend," said a soft voice behind him. He whirled, to look into the bearded face of Elam Fahey, whom he did not know. He brushed his hand over his face. That white face, with its black beard—for a moment—— But Hackel was not a man to blaspheme, and he knew that the Time of the Return was not yet, for all the faint resemblance of this stranger to certain sacred pictures. He dressed like a man, in man's rough clothing—clothing as rough as that of the poorest in Hackel's congregation. He was a *man.*

"Who are you, sir?" asked Hackel.

"I am Elam Fahey. The name will mean nothing to you, sir. But tell me, what is happening there?"

"A miracle. The wind, the dust, has come up against an invisible obstacle. The hand of God stays the dust. God has spoken in the lightning and the thunder——"

"Tell me, reverend," said Fahey, "what would happen if there really *were* an invisible wall there, and the dust were piling up behind it. How deeply would it thus pile?"

"God only knows, since it is His doing," said Hackel.

"And if the wall were withdrawn?"

"There would be a vast dune. For who can pile dust straight up and down, for any height, and force it to stand thus? Only if there were rain——"

"Or the wall slanted *toward* the wind, eh?"

"Yes. Though just why you ask—just why you, a stranger, come among us and ask——"

"There was another Stranger once, my friend——"

"Do not blaspheme, sir!" snapped Hackel.

"I do not. Direct me to the nearest telephone."

Hackel did so. The congregation kept its eyes on the miracle. Hackel faced the miracle still, his hands clasped behind his back, and he looked like a patriarch of a tribe of ancients. Now and again, as though sight of the dust suggested it, he brushed his black garments. But no dust flicked off them, close though the dust was. Other members of the congregation flicked their clothes, too, and some licked their lips, and were surprised to find them free of any suggestion of dust.

ELAM FAHEY came back, looked up at Hackel.

"May I talk to your congregation?" he asked quietly. Awed, amazed, Hackel nodded, stepped aside. Elam Fahey stepped onto the platform. He raised his long arms.

"Ladies and gentlemen," he called. "You have indeed witnessed a miracle. God gave us power over *His* power, and you see what we do with it? It is necessary to explain this to you all, because there is so much I do not know, that must perhaps be done. Let me say here that I caused the dust storm to stop short, where it did, by erecting a wall through which nothing could pass. I am sorry, and ask your pardon from the depths of my soul, that I was compelled to sacrifice some of your live stock. It will doubtless be buried under hundreds of feet of dust, but it could not be helped. I believe you would rather lose some than all—rather stop the storm here, than have it sweep your countryside entirely——"

A low murmur rose from the crowd.

Who was this man who claimed credit for what every one could *see* was a miracle? That for which every one had heard Hackel pray? The prayer had been answered! Elam Fahey understood that murmur perfectly. He knew that for the moment he was in danger and must talk fast.

"You've all heard of Marconi, who died recently, before he could perfect his 'walls of force,' designed to form barriers for all nations against all other nations? I have had access to his papers. Marconi was my friend. I was an humble student who sat at his feet, figuratively, and listened, sought to learn. The wall that holds back the dust is the answer. It is miraculous—as electricity is a miracle, power a miracle. And then, my friends, everything is a miracle—even the curse of dust, the plague of drought. This, my friends, I have done—quietly, without publicity: I have set up stations throughout the Dust Bowl—stations equipped with apparatus built to Marconi's specifications. I have had the help, and still have, of great, far-seeing scientists. They work with me now. I talk to any of them by telephone. To-day they watch the greatest experiment ever attempted by man—the staying of the dust storm."

They stared at him, forgetting to murmur. As one they moved forward, closer to the platform, looking up into his white face. There was something strange about him; they were trying to discover what it was. No superstitious primitives, these, but hard-working people who knew their books, who studied the soil—men and women and children who possessed their own souls. Not fanatic, they were ready to listen.

"All sorts of experiments have been suggested," said Elam Fahey, "to make an end of the drought curse. Nothing has been done. All sorts of theories have been advanced. A great president proposed a wide band of newly planted forest, reaching from Canada to Mexico. But how can that be planted? Where are the hands to do it? Who of us can wait for it to be done? I offered my theories, my specifications, to the government—to the secretary of war. He had me thrown out as a crank. He suggested I go to the secretary of agriculture. I could not do that, and he knew it, because he was playing golf with him that very afternoon! So I gathered my friends about me, and we made our plans. Strangely enough, they would never have been put into effect had it not been for that same secretary of war! Doubtless, in the pages of history, all credit will go to him—and rightly, too; for but for his sarcasm I would never have thought of this.

"First, how is drought to be ended? Water is needed. But who can make rain fall when and where needed? It cannot be done—or so people believe. Mountains catch clouds, and rain comes from the clouds. But this land is almost level for hundreds upon hundreds of miles. Can we cause mountains to rise at our will? If we could, would we dare do it? Would not the whole face of the world be changed? Would not the seasons be affected? Would not earthquakes be caused that would shake down high buildings in the most distant cities?"

"You're not trying to tell us," said a farmer sarcastically, "that if you weren't afraid of causing trouble you could build mountains on these plains, bring rain when and where you wanted to?"

Elam Fahey hesitated, then leaned forward. "Great almost as the miraculous power of God is the imagination of mankind—because imagination is itself a gift from God! Can't you *imagine* machinery, or power, or rays, that would cause the faults of the rock base, far down under us, to shift, to upend—to rise, lifting the crust on which we stand—to make mountains? Yes, you can imagine it. And what do the great and

wise of our race say of man's imagination? I'll tell you: *'What man can imagine, man can do!'*

"I have shown you that the wind can be stopped. I am piling up the dust behind an invisible wall of power which is just as long and just as high—yet so thin as to be utterly invisible—as I wish it to be! Now, my friends, the mountain of dust behind it must stand when the power is withdrawn, when the invisible wall is taken away! That wall can be taken away instantly, by touching a button in a tiny laboratory four hundred miles from here! But the wall of dust must stand! Tell me how to bring this about——"

HE SAW that they were beginning to believe him. How could they help it, with their eyes on that mountain which had been brought to an abrupt, uncompromising stop?

"If there were rain, when the wind stopped——" said some one.

"There shall be rain," said Elam Fahey, who felt oddly like a king granting boons—like a god granting forgiveness of sins.

"But if the wind stops within a week," said Hackel, "the result, behind your invisible wall, will simply be a big sand dune, affecting the weather hereabouts not at all. If you could force the wind to continue—on and on—piling up the dust——"

"It shall continue, provided you assure me that human beings still inside the storm, on the other side of the wall, can survive."

"They survived years of it. I guess they can stand a few weeks of it now!"

"Then the wind shall continue. For what is wind but a weather condition that can be induced—*by power!* What else?"

"Suppose mountains, or hills, *are* formed—and they are not big enough? They will be bare, and dry——"

"I have promised rain. And rain will cause green things to grow upon the hills and the mountains. If not enough grow, government people can be sent here and there and everywhere throughout the Dust Bowl, to see to planting. Now, my friends, mountains catch the rains, don't they? And usually the mountains are covered with forests——"

"How high does this invisible wall of yours reach, mister?" interrupted some one.

"To infinity, as far as I know. There is no way, really, of knowing; but certainly deep into the stratosphere!"

"Then it's higher than Mount Whitney or Everest?"

"Higher than both, one piled atop the other!"

"Then your wall itself can cause rain?"

"Exactly! That's why I promised. But if it causes it here—and the wind keeps coming out of the west——"

Thunder interrupted him, volleying from north to south. Lightning flashed again and again. Rain began to fall—huge drops of it. Horses neighed with delight. Cattle lowed.

The wind from the west continued, piling the dust against the wall. And down through the dust, mingling with it, came the rain. Higher and higher rose the artificial mountain that Elam Fahey, with his wall of force, was building. It was covering houses and towns along its mighty length. But nobody seemed to care. People had had warning and had left those houses and towns. The houses would add, even a little, to the hulk of the mountain.

Elam Fahey stayed until the storm was finished, until the west was empty of wind. When that came about, aviators who, for weeks, had flown wide of the Dust Bowl, now flew over it again—and, looking down, gasped with amazement, and thought themselves lost after all. For Elam Fahey had found a way to build mountains, a way to make them stand. The Dust Bowl, by care-

ful maneuvering of his walls—done by button pressing at exactly the right times, and governing the right places—had been turned into a mosaic of mounded hills. "Hills," the newspapers said later, "that cast no shadows."

ELAM FAHEY looked at his work from the air. It pleased him, though it was far from enough. The hills were not mountains; they were monster dunes. But they showed what could be done. He talked to the Dust Bowl by radio.

"Telephone my laboratories, reporting weather conditions," he told them. "When rain is needed, we shall furnish it. If wind—God forbid!—is wanted, we shall cause it. Listen, my friends. Perhaps this is not the answer, but it shows us the way. Perhaps it will be necessary for us to try our hands at actual mountain building. If we feel it necessary, will you believe? Our experience leads us to believe that those who sit in high places are likely to laugh us to scorn as visionaries. There is one way to answer them—for you are the rulers of this land! By the ballot you fill the seats of the mighty. Let your strength count there—as well as in this land we hope to make fertile again—that we shall, God willing, turn from a hell on Earth to a new Garden of Eden, which stands at the edge of Paradise! Telegraph me, or write me, at my laboratory. And tell your representatives at the capital how you feel about things at the same time!"

Then, chuckling, the light of a great vision in his eyes—though scarcely a beginning had been made—Elam Fahey flew back out of the Dust Bowl, to find out what the world had to say of his experiments.

It had a great deal to say. Soon he hid himself in his laboratory and put his hands over his ears so that he would not hear.

And it was to him there that the messenger came—in the shape of Fahey's secretary—to say that the secretary of war, and the secretary of agriculture were waiting outside, humbly begging an audience. Elam Fahey considered.

"Tell them to wait," he said. "I've got a golf game on."

"But Mr. Fahey, you don't play golf! You've never had time to learn!"

"That's right, son, but tell them anyhow. I want them to understand what it is like when the *other* fellow sits in the driver's seat—and makes better men wait, and then belittles their ideas for the betterment of mankind! It might be a lesson worth their learning!"

Ormoly Of Roonerian

by

Warner Van Lorne

in the January Astounding Stories

The Unseen Mass

Brass Tacks is back again. But to be effective, tacks must have points. It is up to you to supply those points. In another way our Brass Tacks compare with the commercial variety; much of their work is done, of necessity, unseen, and their influence lasts.

We can't publish all the letters; only a certain number of words can be put on a page and cutting letters is bad policy. It is too easy to alter the effect of a sentence or paragraph by dropping a few words. I try, therefore, to publish the letters intact.

Those which do not reach print have their effect; no letter goes unread. Because those unpublished must, necessarily exceed in number those for which there is room, the unpublished letters have greater total influence than those appearing. Three divisions really make up a magazine: the authors, the editor and the readers. Author and editor can consult directly in a mutually helpful manner.

But tens of thousands of readers cannot meet directly with authors or editor. Your wishes must come indirectly, and Brass Tacks is a cross section of those wishes—insofar as I can make it a fair cross section. But like any cross section it can touch but a small fraction of the total mass.

They help me; they help authors in determining what type of material will be most satisfactory. The visible Brass Tacks might be considered as the three-dimensional cross section of a shadowy four-dimensional mass moving restlessly beyond sight.

And it does move, restlessly, onward in a way that has both interested and pleased me. I have on hand material from a number of our old favorites; in addition the work of some new writers. Because that shifting, unseen fourth-dimensional Brass Tacks changes progressively and constantly, I am interested in both old favorites and the new names.

Watch them both. Perhaps in some of the new names you will see in coming months you will find the men who are to become new "old favorites." They are for you—and Brass Tacks—to discover.

The Editor.

The Secret of the Rocks

A miraculous sixth sense—piercing the veil of time——

by Russell R. Winterbotham



Alien animals—diamonds—and a phantom sun in the middle of the night!

MY NAME is Oliver Humboldt. I have been informed of my legal rights and have been told that this statement may be used against me in a court of law. Three alienists have pronounced me sane—without having heard my story, of course.

Nevertheless, I believe I *am* sane, although there have been periods of doubt. I believe a record of what I have experienced should be preserved for a time when science more fully understands the greatest mystery of creation—life.

It is unnecessary for me to give my entire life's history. It is sufficient to say that I came from parents of moder-

ate means and that I was normal in every respect until after I left college. When I say normal, I mean that there was nothing about me that was unusual. I possessed average ability and intelligence. I was capable of looking out for myself and showed promise along certain lines. In my chosen field it might even be said that I was above average. But no one suspected—until I left college with an engineering degree tucked under my arm—that I was a genius. Indeed, I surprised myself.

To say that my gift did not manifest itself is not entirely accurate. As I look back over my early life, I recall many unexplainable instances that are clear to me now. The fact that I became a brilliant geologist can be explained in no other fashion.

From the start I was lucky. I made fortunes, for others, in the development of mining properties. I traveled over the world and never failed to find deposits of petroleum, radium, coal, gold, silver and precious stones. My gift was uncanny.

On the surface these discoveries apparently were made scientifically. But I knew from the start that I was playing hunches and that my charts and drawings were about as scientific as an Indian snake dance. I knew the science of geology and could have worked out scientific charts had I wished. But it tickled my vanity to fool the other geologists by mere guesswork.

At first I thought it was pure luck. But my finds were too frequent and my failures were too few for pure chance. Something in my subconscious mind prompted me to point to certain spots and say: "Drill here. You will find oil," or "Dig here. You will find gold."

There were chances beyond human imagination that I could not have done it more than once in a lifetime. Yet, I did it many times. Unfortunately, while I made fortunes for others, I was not businessman enough to make a great deal for myself. Then came the depression. I made a mistake.

I WAS in Montana prospecting for a possible oil development with a certain Cyril M. Bislee, who already had made a fortune from my guesswork. Bislee often questioned my geology, for he knew the science backward and forward. But he had never questioned my results.

Our prospecting took us into a valley that had never been worked before. There were unusual formations there: high basalt cliffs, deep gorges extending to early Paleozoic strata. In fact, I observed certain rocks that could have been outcroppings of Algonkian or Archean structure. The valley was old, so old that it did not fit with the rest of the surroundings.

About the valley were newer mountains hemming it in as if it were a geological island.

"You will find nothing important here," said Bislee. "Fossils, perhaps. Interesting geological finds, maybe. But I'm interested in resources."

Something seemed to click in my brain. For the first time I caught a glimpse of what I was later to see daily. Then, however, it was only a flash that left me giddy. My head throbbed. I felt hot blood rush through my veins. I seemed overwhelmed with a sudden anger toward Bislee. My mouth opened and from my lips poured an unintelligible jargon.

It was over in a second, but I found myself advancing toward the cringing Bislee. In my fists I carried rocks.

"Don't!" Bislee was crying. "Don't look like that!"

I was powerless to explain my action. Bislee, of course, was frightened to the point of hysteria. He was afraid, perplexed. I saw in his eyes that he thought I was a madman. He fled from me as he would have fled from a monster.

Poor Bislee later had me arrested. He had me tried for insanity and I was

found sane, of course. But Bislee was through with me. He passed word around among other mining men that I was crazy and, naturally, he was believed.

The depression, of course, was a period when no one made a great deal. But I might have made a living, at least, had it not been for my break with Bislee. In Bislee I had made an enemy who threw every obstacle into my path. I spent what little money I had saved and then became one of the hungry, homeless thousands who begged for dimes on street corners and who slept in parks.

IT WAS in the spring of 1933 that I had my next experience with my curious dreams. I was sitting in a park of a large city in the mid-West. Suddenly, the scene about me seemed to fade. I was no longer in a city, but in the center of a vast plain, teeming with queer forms of life. I saw huge, shadowy shapes about me. Once again I felt that inner surge of anger and rage. My breath came in short gasps and in my heart burned a lust to kill.

Then the scene slowly faded. I was alone on a park bench. The incident almost convinced me that I was crazy. I fled to the railroad and caught a train out of town. I sat on the side of a tank car with my feet dangling in the breeze. I dared not sleep for fear the dream would come again. It did come again, but I was fully awake.

This time I saw mountains marching down to a shallow sea. There were tall trees, conifers and hideous animal life. At first I did not recognize the animals. Then they seemed to come near to me and I saw what they were. I recognized several types of iguanodons, several individuals of the genus theromorpha with large, tusklike teeth. In the sea were plesiosaurs, ichthyosaurs and huge, forty-foot sharks. Overhead flew pterodactyls, ramphorhynchi, the earliest birds, the archeopteryx and insects so large that they looked like turkeys—hymenoptera and lepidoptera.

The train seemed to be carrying me toward a huge smoking volcano. I saw a phantom sun shining overhead and although it was night, it seemed to be day.

The shock caused me to throw myself from the cars. Fortunately, the train was going slowly. I was scratched and bruised as I fell, but I did not mind. I seemed to be falling into a sea filled with alien forms of life. I felt the water rushing into my lungs and I literally swam toward the shore.

The animals apparently took no notice of me. The huge dinosaurs went about their business, hardly noticing my presence. The pterodactyls sailed about, swooping from time to time to the edge of the water to attack an amphibian. Then my eyes caught something glistening in the sands. I blinked and dug my hand into the ground. Around me were thousands of diamonds.

The dream faded—I stood on a lonely hill and my hands were full of dirt.

I WAS not fooled this time. The reasons for my remarkable geological finds were clear. I possessed some miraculous sixth sense, I thought, that allowed me to pierce the veil of time.

One of the most unusual features of my experiences was the fact that I failed to recognize, at first, just what allowed me to make these finds. Had I recognized the gift from the start, I am certain that future events might have been quite different. Instead of allowing the only possible logical explanation, I fooled myself with all sorts of explanations. At one time I even toyed with the idea that I had the power to travel through time! Of course, that is what I did in a way. But—since I had no power to act on the past and my actions were always governed by certain circumstances and I was not a free agent—it could hardly be said that I traveled through time.

I gave up the idea that I was crazy. My vision had been too real and too vivid for an hallucination. I was quite certain that I had a gift of second-sight. I had discovered oil, coal and other minerals in the past through this gift which had worked through my subconscious mind. Now I had discovered diamonds. I knew there were diamonds in this spot. I knew it as well as I knew that there was a railroad track a few feet away.

The problem was how to obtain backing to mine the gems. Diamond mining is an expensive proposition. Only Bislee could furnish the capital and he hated me.

But I resolved not to give up without a struggle. For three months I slaved to earn money enough to buy myself clothing suitable to call at his office. I did menial tasks; washed dishes in restaurants, swept floors, dug ditches.

Then I called on Bislee. It was ridiculously easy to get an audience with him. The minute I called I was ushered into his office. He seized me by the hand and pumped my arm as though I were a long-lost brother.

"I've been looking for you for months, Humboldt!" he exclaimed. "I've had private detectives on your trail! Can you ever forgive me? I want to apologize for what occurred in Montana."

His cruel, greedy eyes looked as near remorse as I've ever seen them. His voice reeked with feeling and for a moment I was touched.

"Let's forget it," I said with generosity.

"I'm glad!" he breathed. "I'll tell you, Humboldt, you are a famous man. Geologists have made a rightabout-face in regard to your computations. Man, they've found that you are a genius!"

Glibly, he explained. It seems that one of the geologists in the Southwest had taken a second look at some of my charts, previously labeled as fakes. He had discovered that my formations possessed a certain logical quality that was inherently correlative to the exact structure of strata in the neighborhood. Looking over other charts, he had discovered that they all bore the same strange resemblance. They were not accurate, but they were logical. Then it was found that the differences could be accounted for by slips and erosion. *My charts were what the strata should have been!* Nature had made the strata otherwise.

I should have felt elated over the restoration of my reputation, but I was not. I was more interested in diamonds. I had been on the rocks so long that wealth was all that mattered. I did not care for fame, unless it brought me wealth.

WHEN Bislee had finished his story, I told him mine. I did not tell him about my strange gift. Bislee once had suspected me of insanity and I was not going to allow that occurrence to be repeated. I simply said that I had located a geological formation that promised diamonds and that I wanted backing.

"You shall have backing, Humboldt," he said. "I am prepared to offer you more than any other man in the world. I'll share one half the profits with you, stand all expenses and furnish all equipment. You can work for me forever on that basis if you wish."

Bislee's eyes grew smaller and more greedy as he spoke. He looked ratlike as he sat there, squinting at me from beneath those shaggy brows of his, waiting for me to jump at the bait.

Then the room faded. I was in the center of another valley, not unlike the one I had seen in Montana. Around me were huge dinosaurs. Some of them were feeding on trees and herbs; others were splashing in the water of a shallow lake in the center of the valley.

"What do you say, Humboldt?" he asked.

The question brought me back. Once

more my senses were dulled with the feeling of rage and the lust to kill. My hand was toying with a paper weight. Quickly I suppressed my impulse to throw it at Bislee's skull.

"It's a bargain," I said. "Draw up a contract. Between us, we can get a corner on all the resources of the world."

"Yes!" Bislee hissed. "Think of it! We can use our profits to buy existing mines until we own all—everything!"

Suddenly, words popped out of my mouth. It was a verbal reflex. Something in my medulla oblongata short-circuited, just as it had done in that ancient Montana valley.

"The eggs!"

The effect on Bislee was remarkable. At first he whitened. For an instant he looked as if he would faint. Then he cringed behind the desk; his hand moved into a drawer and it came up with a pistol pointing its ugly nose at my head.

"You fool!" he hissed. "You *are* crazy!"

"Be sensible, Bislee," I pleaded. "It was a slip of the tongue. Perhaps I am not quite all there"—I tapped my forehead—"but I am harmless." It was necessary that Bislee not know of the impulse I had to kill him a few moments before.

Bislee licked his lips and laughed nervously. "We're both on edge, I guess. But don't mention eggs to me again. Something about them makes me shudder. I'm even hypersensitive to eggs in my food. I can't eat them. I hate them. I've been to clinics all over the world, but no one can explain it."

Had I known more about my strange gift, I might have guessed the answer right then. Unfortunately, my revelations up to that point had been so few that I was unable to judge that Bislee—as well as all mankind—was strangely linked with the past. My link rested with geology and a lust to murder. Bislee's link was a hypersensitivity to eggs.

OUR PREPARATIONS for prospecting the diamonds required several weeks. During this time I lived with Bislee. He was a bachelor and lived alone, save for a Japanese servant, in a penthouse.

During this time I kept my visions well under control. Not one slip did I make until the night before we were to leave for the West.

Bislee retired early that night after wasting an hour with me in dull conversation. I browsed for a time among his books in his library.

I suddenly felt vague stirrings within my mind. Slowly the walls of the room began to fade. I saw the ripple of water. I was under the ocean, swimming like a fish, and I had gills. I could feel the water passing through my mouth and out the slits.

On all sides of me I discerned dim forms of sinuous creatures: huge sharks, measuring forty feet in length; long, sinuous eels, slimy creatures of the deep; animals I had never seen, even in fossil form.

They all seemed to avoid me. Suddenly, out of the darkness I saw a form flash by in dizzy speed. Something seemed to send my blood leaping in fury through my veins. I wanted to kill. I thirsted to slay.

Suddenly, the dream faded. I felt my heart still pounding and my muscles tighten in anger. I was no longer in the library, but in Bislee's bedroom. Through the window streamed light from the full moon. I heard him snoring gently.

In my hand I held a knife.

AS I HAVE said, I was a normal man up to the time I became possessed of these visions. I had been taught to abhor murder. Yet, as I stood there looking at that defenseless, slumbering man, I felt an urge to kill. I knew that

I would kill him if I did not leave. I fled from the room.

From that time on I knew I was destined to kill Bislee. It was then that I toyed with the idea of reincarnation. I imagined that in a prior life—possibly when I lived as an animal in prehistoric times—Bislee had wronged me and I was now to have my revenge. But the idea was as silly as it sounded. It is possible that I am a reincarnation of something that has lived before.

I do not reject the belief nor do I reject any religious belief. I simply state that if my visions were the result of reincarnation, there was something added. I have never been overly religious, but I have learned never to jeer or scoff at theologies. If there were but one truth in a thousand religions, it would pay man to be tolerant. Science often has a thousand failures before achieving one success.

But I was convinced that there was something more. It is possible that I somehow caught and held within me a spark of the electrical and chemical mechanism that made other organisms live long ago—a spark of a creature that once lived and is now dead. But again, why hadn't it happened before?

As weeks passed I was able to raise visions at will. Whenever I did this and whenever I slept, I chained myself to some fixed object with a pair of handcuffs I purchased for the purpose. I was determined to postpone the murder for which I was destined as long as possible—at least until I had amassed enough wealth to ward off extreme punishment or perhaps obtain freedom through the expertness of a lawyer.

Always my dreams were accompanied by a surge of murderous madness. Sometimes I would be a creature of the sea; sometimes I would be a land animal in my dreams. Always I would meet and combat some animal nearly the same as myself, but somewhat different and of lower development. These battles were tough and furious, although I never saw the end of one of them.

BISLEE and I traveled together to the place where I had seen the ancient volcano and the diamond-littered slopes. We set up an oil rigging, spudded a drill and spread the information that we were wildcatting. This brought jeers from geologists who said there wasn't a drop of oil nearer than the closest filling station—which was twenty miles—and no petroleum within five hundred miles. Nevertheless, our drill went down.

I dreamed vividly each night. For my dreams I reconstructed the history of the entire rock structure, down to the lifeless Archean period. The diamonds were in the late Jurassic.

Our drill went through familiar formations down to three thousand feet, where it struck a hard basalt layer. We pierced this and found blue clay and diamonds.

Only two men—myself and Cyril Bislee—saw those diamonds. We salvaged more than a gallon of them from the clay. Then Bislee ordered the casings jerked and the hole capped.

"That's enough here," he said. "No use flooding the market and bringing down the price. There'll be more when we need them."

We moved on. We found gold, radium, petroleum, phosphates, molybdenum, scores of deposits of rare elements and precious minerals. Sometimes we mined a little, but usually we moved on to locate new lodes. The diamonds more than paid our expenses.

Then we stopped prospecting. We hired a plane and flew over the world. We didn't stop even to dig. We located deposits, marked them on our records as we flew. It was done through my dreams, of course. Bislee suspected something—clairvoyance perhaps—but he said nothing. He had faith in my ability, whatever it was.

Nothing could stop him. We located enough minerals to last the world a thousand years. We could not have developed even a tenth of these deposits in our lifetime. Already we were the richest men in the world. But still he kept on.

For the next few years we flew over every nation on earth, marking out deposits and recording our finds. It was only necessary for me to fly above a stratum in order to discover it.

Then for three months we found nothing.

"That's all," I said. "We have discovered the wealth of the world."

Bislee smiled. "There's one place we haven't visited—the place in Montana, that old valley where you started to kill me."

"But why go there? I'm sure there's nothing in that valley——" I stopped. There *was* something in the valley—something we had never found, something rare and valuable. It was then that I knew the secret of my gift. It was linked with that valley.

I looked at Bislee. He was sitting across a small table from me in the cabin of the plane. His hand came up over the edge of the table and I stared into the muzzle of a gun.

"We're going to that valley," said Bislee. "There's something there you have kept a secret all these years."

I laughed like a madman. Secret! I had kept more than that valley a secret all these years! That valley he was asking to see would be his burying place!

But there was no dissuading him. He was determined to see that valley. He locked me in my quarters on the cabin plane. I was a prisoner, but I hardly cared.

As the plane soared back toward America I dreamed as I had never dreamed before. I saw a million fights between two beasts. Each time the beasts were different, but each time I knew they were moved by the same savage impulse that was gnawing at my own mind, egging me on to kill Bislee.

THE PLANE roared over New York; it passed Cleveland, St. Louis, Kansas City, Denver. It swerved northward. Then slowly it settled down in that ancient valley, the geological island.

Bislee swung open the door of my cabin. "Are you ready to go to work, Humboldt?" he asked.

"What if I should refuse?"

"You would not refuse long if I cut off your food and water." He smiled. "Where do we dig?"

I turned my eyes toward the basalt cliffs. The layers stood out like printed pages. It was almost as if the strata had been labeled: Tertiary, Cretaceous, Jurassic——

"There," I said. "The Jurassic formation."

Bislee rubbed his hands. "If you are wrong, Humboldt, I will kill you."

We left the plane together. Bislee walked behind me with the pistol in his coat pocket pressed against my back. Slowly we scaled the side of the cliff, climbing over rotted boulders of Algonkian age, past Cambrian limestone, over the crust of the Ordovician period, up past the Silurian and Devonian strata. We saw outcroppings of coal in the Carboniferous layer. Then we crossed the Triassic and reached the Jurassic.

The Jurassic stratum was a wealth of fossils. I stumbled over a perfectly preserved pectoral arch and forelimbs of the edestosaurus, a large marine reptile rarely found in the fossil beds. There were imprints of huge insects in the rocks and bones of several small mammals—plagiaulax, amphitherium, phascolotherium—all marsupials.

"Dig here," I said.

"But what will I find?" asked Bislee.

I laughed. "Something that dreams are made of, Bislee—something worth

its weight in gold, but something you will wish you had never found."

Bislee dug. He was afraid of nothing that came from the earth. He was a miner, a gnome whose existence depended upon the secrets of the rocks. I had aided him in unlocking many of these secrets. The wealth of the world was his. The undiscovered resources of the world no longer existed, each lode, each pool, each deposit was charted and recorded.

Bislee owned them and as surely as I had found these resources, I knew he would squander them. I knew he would trade and barter his secrets to men like him, who would throw oil, coal, metals and minerals to the winds, wasting without a thought of the future. I knew this, not because I was a prophet or seer, but because I had a gift. I call it a gift; yet every creature that walks the earth has it. I possessed only the ability to use this gift intelligently.

My gift was the instinct that causes birds to fly south in the winter and north in the summer. My gift makes salmon swim thousands of miles to spawn. My gift causes roots to grow down and plants to grow up. It is instinct—racial memory—born of a desire for racial preservation. And if ever a racial memory was needed, it was needed now—with Bislee in possession of the resources of the world.

HE dug downward. He threw aside bones of animals never found in fossil form before. He destroyed what nature had taken sixty million years to build.

I did not protest. This was the last thing Bislee would destroy. I closed my eyes and began to dream once more.

I was a small, furry marsupial watching another creature which had its eyes on two huge, dumb dinosaurs. It was an ugly creature with small, greedy eyes like Bislee's. Its lips were curled into a snarl of hatred for all reptiles.

Near by were hundreds of dinosaur nests filled with eggs. One nest would have made a meal for both of us. But my companion had different ideas. Running from nest to nest, he began to smash the eggs. His teeth would sink through the leathery covering, letting the fluid pour out. My blood boiled. Food was being ruthlessly destroyed. A genus of reptiles that meant food for my kind was being destroyed. The eggs could not hatch to become egg-laying reptiles unless they were whole.

Once more the familiar lust for blood surged through my body. I was at this furry beast, biting and clawing.

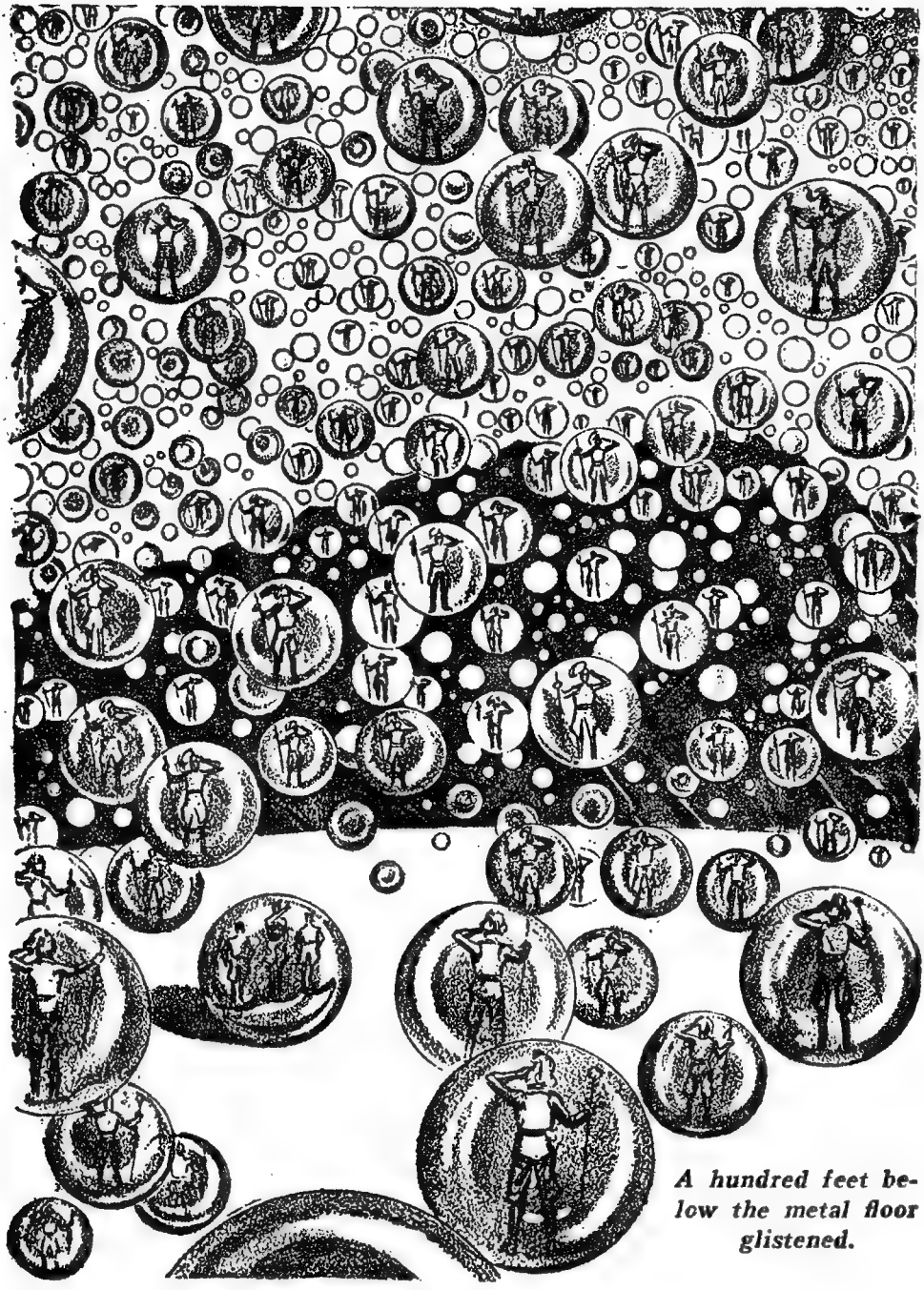
I heard Bislee scream: "Eggs! How I hate eggs!"

His cry ended in a gurgle as my fingers closed about his throat. The attack had been too sudden for him to reach his gun. It was over in a few minutes. Bislee, whose records listed the resources of the world, was dead. But his records live on for his heirs to find and to use.

I remember throwing his body aside, letting it roll to the side of the nest of fossilized dinosaur eggs—the remnant of another day when two furry creatures fought over the despoiling of another kind of natural resources. Next to the nest lay the preserved bones of two prehistoric marsupials which had died in mortal combat over the spoils.

MY WISH is that this statement will be read to an intelligent jury, one capable of recognizing that homicide directed toward racial preservation is as justifiable as homicide in self-defense. Both the dinosaurs, who laid those ancient eggs, and the marsupials who depended on the eggs for food, are now dead.

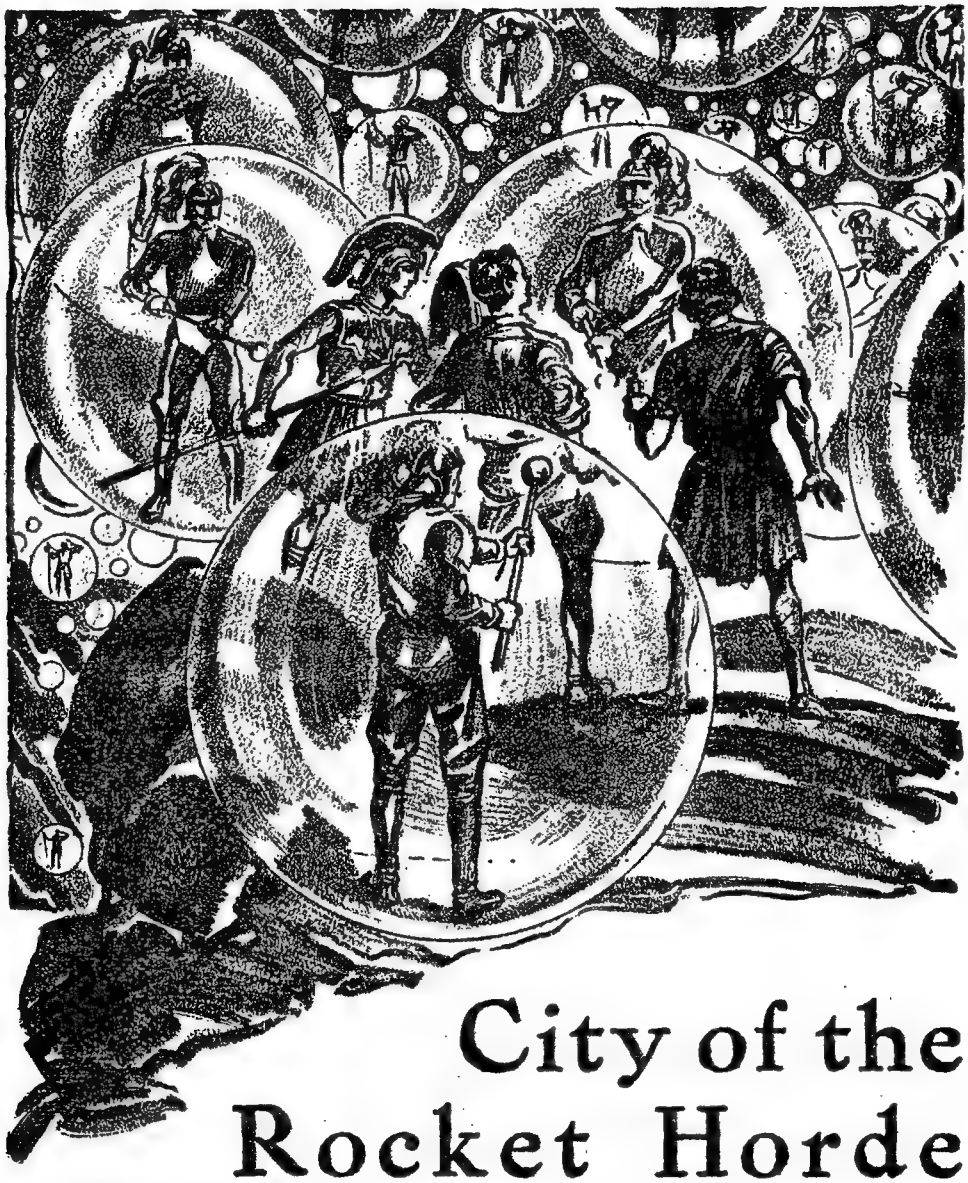
Will mankind squander the earth's natural resources and in doing so throw away his livelihood? The future will answer, but the jury must guess the answer.



A hundred feet below the metal floor glistened.

A sequel to "Past, Present and Future"

by NAT SCHACHNER



City of the Rocket Horde

THREE MEN, heirs of different ages, clad in different habits, united only in a common bond of aloofness, stood motionless on the crest of the ridge, staring at that which lay in the mighty valley beneath them.

For six months since their escape from the neutron-walled city of Hispan they had struggled doggedly over a dead world, forcing their way through trackless forests, ripped by brambles, stung by venomous insects, wading innumerable streams, freezing in the snows of mountain tops, stewing in steamy swamps and jungles. Faces always to the south, steadily, grimly, the last faint hope slipping quietly beneath their aching feet.

Sam Ward, American, erstwhile member of the twentieth century, led the way. He alone of the trio knew the jungle, its savage ways and secrets; he alone knew the geography of the vast continent into which they pushed, a continent that had once been mapped as South America.

Kleon, the Greek, young and cleanly limbed as a god, plodded along steadily in his Macedonian armor, gripping his javelin and short, broad-edged sword with an ever fiercer grip. He had marched with Alexander into Asia; would he now complain of this new and more terrifying wilderness?

Beltan, Olgarch of Hispan, tawny of hair and smiling of mein, suffered the most. His purple garment of woven threads, caught up at the waist, was not adapted to jungle traveling. Nor was Beltan himself, for that matter. Within the immured Levels of Hispan there had been no tearing branches, no blazing sun, no sucking mire. Even the knowledge of these things had been vague and but a legend of ancient days; to be broken only by the strange apparition of these two sleepers from mythical and disparate times—his comrades now.

Yet he made no complaint, nor was he sorry. A sense of freedom, of individuality unknown before, pervaded him and soothed aching muscles and torn flesh. He had been an Olgarch of the ninety-eighth century, the apex of a delicately balanced, if restricted civilization, far superior to the others in knowledge and power. Yet from their very first appearance he had envied these primitives, themselves separated by two thousand years of time—their gusto, their independence, their purposefulness.

As the days slipped into weeks and the weeks into months on their endless trek, Sam Ward had grown more and more uneasy. He had found for them the game that slunk in the jungles, strange animals dimly resembling the ones he had known, yet altered much by environment and eight thousand years of man-free evolution. Sometimes he brought them down with crashing bullets from his Colt forty-five, sometimes Beltan unleashed his blue electric bolts, but more often they relied on the primitive javelin of Kleon. Both bullets and bolts were irreplaceable, and who knew when they might have desperate need of them?

Beltan had grimaced at first at the strange taste of meat, bloodied with stricken life, cooked over fires started by the convex glass of Sam's wrist watch or by husbanded matches he had found in his khaki pockets; for the Olgarch was accustomed to synthetic pellets of food. Nevertheless he held his peace and ate with the others.

SAM steered south as well as he could. It was simple enough through the narrow neck of what had once been Central America—the moveless oceans on either side charted the way; but, once plunged into the vast southern continent, it was a different matter.

His first great shock came as they lunged blindly through what he calculated must have been the Panama Canal. No vestige remained of that mighty engineering gash, no sign that it had ever existed. His second came as they skirted the northwestern coast of the continent, where Caracas, the capital of Venezuela, should have been. There was only jungle, vast, interminable.

Despair seized him then. In all their hundreds of miles of weary wandering not once had they come across the sign or spoor of a human being, or of human work in any form. Earth seemed in truth a dead planet, swept clean of humankind, of human civilization.

He called a council of war. "It seems," he told them dully, "that the legends were correct. Earth is sterile, shorn of mankind, except for the single neutron-enclosed city of Hispan. The cataclysm—comet, runaway planet, **or**

whatever it was—did its work thoroughly. We cannot go on forever in a hopeless quest. The problem now is—what shall we do?"

Kleon leaned on his javelin, wiped the sweat from his fair brow. "If only we had some women," he said speculatively, "we might re-colonize the earth. Even so did my Athenian comrades on the shores of the Euxine and beyond the Pillars of Hercules."

Sam grinned without mirth. "But there *are* no women," he retorted. "Only three damn fool males whose very processes of thought are different. What do you say, Beltan?"

The Olgarch was deadly tired. His aristocratic face was pale and drawn with unaccustomed hardship. But there was no droop to his proud head, no halt to his careless smile. "I say," he replied calmly, "go ahead. I regret nothing; not even if the world is as sterile as our tales have told. Freedom, death itself is preferable to the purposeless, stifling luxuries of Hispan. You, Kleon, spoke once of Odysseus sailing beyond the bath of all the stars; you, Sam Ward, enlivened the way with stories of men who breasted the frozen wastes in search of the unexplored. Shall we three, at this far later date, be less indomitable than those men of an earlier day?"

Sam Ward's smile widened. The chill that had invaded his being, fled. These were men after his own heart. Three against the gods; three against a desolate planet! Three men, diverse in thought and time, yet animated by the basic courage that had originally brought mankind up from the brute.

They ate in silence the strange web-footed animal that looked like a small deer and tasted like wild duck. They stared at the great flooding river that made an impassable barrier to the east—it must be the Orinoco, Sam decided. Then they tightened their belts and started once more, this time to the southwest. On the Pacific coast, perhaps . . .

For weeks they climbed painfully the mighty surge of the Andes; up, ever up, to the very roof of the world. And nowhere a sign that human beings had been; nowhere a sign that they had ever existed.

Then, suddenly, they had crested the final ridge, and the sun, curiously tilted to the north, threw long lances of flame into the circular bowl of the valley beneath, disclosed a staggering sight.

THE DEPRESSION, three thousand feet deep, was as smooth as a ballroom floor. Within the mighty round of the upthrusting ramparts it extended, geometrically circular, wrinkleless, shining with a hard bright luster of its own.

"Why, it's artificial!" Sam gasped. "The product of man's handiwork, of a race of engineers beyond all twentieth century conceptions."

"Of course it is," commented Beltan with a little frown. "Only—what has happened to the people who leveled the valley, and coated it with that strange substance?"

"Dead!" Kleon asserted. He picked up a massive rock, heaved it out over the perpendicular cliff on which they stood. "See!"

Breathless, they watched its downward flight. Seconds of tremendous acceleration, of rushing sound into the yawning abyss. Then it struck, bounded high into the air, bounced again and again like a rubber ball on elastic ice.

Moments later came the waves of impact; Bell-like tones, lambent with a ringing hardness. But not the slightest spatter or chipping of the lucent substance, not a dent in its surface; though the falling stone had weighed goodly pounds and the energy of impact had been terrific.

Beltan's eyes widened. "Stellene crystals!" he avowed with a certain ad-

miration. "A crystallized alloy of a dozen different metals. Our technicians in Hispan have barely achieved laboratory samples as yet. Harder than anything on earth except our neutron packs, and infinitely more workable. The race that built that surface was well advanced."

But Sam stared with a growing despair. "Nevertheless they are dead and gone, as Kleon says. They——"

The Greek fell back. The keen javelin wabbled in his hand as he pointed it down. "By Zeus and Poseidon!" he stammered. "The valley is moving—up toward us!"

Sam Ward leaned cautiously over the edge, grunting his amazement. Even the Olgarch gripped his electro-blaster with whitened knuckles.

There was no question about it now. At first the movement had been almost imperceptible, visible only to Kleon's eagle eyes. But now it was accelerating.

The whole valley floor, five miles in diameter, was ascending swiftly, smoothly.

Out of the earth it came, cylindrical, shining, lifting upward to the three crouching men on the edge of the incircling mountains. Like an unimaginably huge piston, sleek and glistening, spurting out of the sleeve of the enveloping jacket.

It swallowed up the intervening space; it obliterated the tremendous valley beneath; it rose to engulf the frowning ramparts of the Andes. Barely a hundred feet below the paralyzed adventurers the vast hard piston came to a noiseless, gliding halt. The sun beat upon its crystalline surface, disclosed nothing. Featureless, unstirring, it reflected the searching rays.

"By the nine darts of Phœbus," Kleon swore, "this needs investigation. Wait for me, my friends, while I go and see——"

Sam's sinewy fingers darted out, caught at his armored shoulder just in time. "Just a moment!" he whispered. "There is something moving."

There was!

II.

THE HITHERTO quiescent surface seemed to blow up into a maze of gigantic bubbles. Great hemispheres, iridescent, rising swiftly, thinning out to sheer transparency.

"I never knew that stellene crystals could do that——" Beltan started, and stopped.

For, with little soundless puffs, the glittering surfaces exploded, and a single mighty shout went crashing through the mountains.

"Harg!"

A hundred thousand men stood stiffly on the inner surface of the lifted valley, in concentric groups of a hundred each, their blond, fanatic faces uptilted to the sun, their left arms raised at similar angles, palms wide, thumbs out; right hands gripping perpendicular lances of tubular metal, tipped by bulbs of stellene crystal.

Again the mighty shout went rocketing and reverberating through the jagged hills.

"Harg!"

"Another city," said the Olgarch, his face working strangely, "and alive! Then the legends were wrong, promulgated by our ancestors to keep us intact within the impregnable walls of Hispan. But what manner of civilization is this——"

"Don't let them see you," Sam rasped. "We had better wait——"

"By Ares, God of War!" grunted Kleon. "They are soldiers, and of a discipline beyond Alexander's phalanx. With men like that——"

The three men crouched behind a jutting rock, peeped down upon the amazing scene. Sam Ward's face was furrowed with unpleasant thought; they had found what they had sought—an-

other city, survivor of the ancient cataclysm, and peopled by human beings—but he did not like what he saw.

The soldiers were gaudily, fantastically accoutered. Dazzling green were their uniforms, faced with brilliant yellows. Fierce blond faces, cast in similar mold, surmounted by peaked helmets of gold, from which long plumes waved in martial sweep. Blond hair cascaded from underneath the helmets, and waxed mustachios swept upward to glistening points.

One countenance was like another, aflame with like ecstatic frenzy. A third time the great cry lanced out from a hundred thousand throats, while red spurts of sizzling flame crashed from the uplifted stellene tips.

"Harg!"

The concussion knocked the three men from different ages flat on their faces, blasted and thundered around the cupping mountains. The atmosphere blazed with disintegrating atoms; flamed with released energy. A vagrant bolt from a stellene tube licked at the overhang behind which they crouched. A moment it glowed cherry red, then it billowed out into a ruin of flaring gases.

Sam blinked, choked, and shoved his comrades back to safety with flailing arms. Six inches closer, and their saga would have ended—abruptly.

THE GREEK, face blackened with the smoke of disintegration, leaped to his feet. Rage twisted his features. He dropped his javelin, tugged at his Macedonian sword. "By Heracles," he howled, "if they wish war——"

The Olgarch's sensitive hand clamped on his shoulder. Smudged with flying dirt though his features were, he had not lost his aristocratic calm.

"They do not even know you exist, my Kleon," he said with a wry smile. "It was a stray blast that almost snuffed out our lives. Besides, your primitive weapon is but a mockery to those stellene-tipped lances." He nodded. "Yes, even my electro-blaster has not their range of destruction."

Sam lifted himself up, felt tenderly of his bruised face. His grin was a painful sight. "And as for my puny Colt," he said sourly, "it's wholly outclassed. These babies have weapons, and manpower, and—worst of all—a driving fanaticism. But what does it mean?"

Beltan edged cautiously to the precipice again. "Look!" he cried. "They have gone mad! They are dancing and twisting in senseless fashion."

Sam was at his side in an instant; then he grinned in spite of his unease. "In my day, Beltan," he observed, "those evolutions, on a smaller, tamer scale, were considered the height of good sense. They are army maneuvers."

It was a fantastic sight! A hundred thousand gaudily uniformed men, lifting right legs simultaneously in stiff-kneed formation, thrusting stellene tubes straight out before them at exact angles, widening their dense-packed clusters in concentric circles, interpenetrating their ranks like opposing ripples in a pond, wheeling into the most complicated patterns, shouting hoarsely their interminable cry:

"Harg!"

As they wove and interwove, they danced stiff little steps, swayed first to the right, then to the left—for all the world, thought Sam, like posturing penguins—their plumes streaming in the wind of their own contriving, their faces set in a single pattern, harsh, fanatical, intent.

Suddenly they fell away, ebbed from the center, lifted their tubular lances high, raised a shout that made all former ones sound like a futile whisper:

"Harg! Hanso!"

"Look at that!" whispered Kleon.

Within the central space another bubble grew swiftly, higher, wider, glowing with rainbow hues, until its curve was

almost abreast of the astounded comrades. Then it shimmered into quiescence, a sheer, transparent dome blown of molecular-thin stellene.

Within its shifting hues a two-stepped dais appeared. On the higher step stood a man—short, dark, sallow-skinned, black hair cropped close to bullet head, clean shaven. On the lower step two others flanked him, likewise short of stature, mouse-colored, with bristling toothbrush mustaches on their upper lips. All three were clad in dark gray uniforms, unrelieved. But on the tunic of the upraised figure three red circles interlocked like the links of a chain.

Alike their countenances were sharp, dynamic; alike their arms lifted in an answering salute; alike their jaws jutted their aggressive surge and their eyes bulged with fanatic lights, but it was the solitary apex of the triangle who cried out in a high-pitched voice:

"Harg!"

"That," observed Sam with frowning concentration, "must be Hanso, Leader, Duce, Fuehrer, Kingfish, or what have you of this latter-day Totalitarian State."

"Eh, what's that?" the Olgarch asked blankly.

Kleon looked bewildered. "You use words, Sam Ward, that hold no meaning."

"Skip it," he growled, "and listen."

Hanso was speaking, head thrust back in studied pose. His voice soared, filled the vast inclosure with clear-cut, rushing sound through some strange amplifying power of the stellene bubble in which he was enclosed.

"Soldiers of Harg," he orated, "the state is proud of you; I, Hanso, am proud of you. A thousand times have I seen you march and countermarch in intricate evolutions, yet never have I seen you perform with such skill, such precision, such magnificent gusto as you have done to-day. Nay, I shall go further. Never in the long history of Harg, in all the combined eras of former Hansos, has there been such a marvelous massing of warriors, invincible in their mighty array, armed at all points with devotion to their glorious city, ready as you are to die, if need be, that the State may live!"

English was his speech, slurred and rotund, stressing the vowels and pronouncing those usually silent; yet intelligible alike to Sam Ward, man of the twentieth century, Beltan, Olgarch of the ninety-eighth era, and even to Kleon, Greek of Alexander's time, because he had donned the inducto-learner in Hispan.

THE MAN paused, and fanaticism swept like a flame over the upturned faces before him. Hysterically they crashed out: *"Harg! Hanso!"*

"Eight thousand years have made little difference," Sam muttered cryptically.

"I don't understand this at all," Beltan said in some bewilderment. "Soldiers—a hundred thousand of them—armed with terrible weapons—obedient to Hanso's will, trained for what? What enemy have they to fear? We have found no other city in all our wanderings. Only Hispan exists, and of that they know nothing, I am sure."

Sam stared down with narrowed eyes. "It is a logical development," he said slowly, "of forces already at work back in our own time. Originally, no doubt, when the cities drew away from each other and formed bitterly nationalistic states of their own, the fascist city of Harg glorified militarism for a triple purpose; conquest, repression of discontent at home, and as a solution for unemployment.

"When the alleged cataclysm of your legend, or the inevitable result of long-continued isolation, brought forgetfulness to Hispan and Harg alike that other states and peoples existed on earth, the vast soldiery nevertheless remained. The thought of conquest was eradicated,



but the other purposes of an army remained. Doubtless discontent was suppressed by insistent propaganda; but, with the march of science and technological improvements, unemployment increased. The army remained; if anything, had to be expanded."

"But what a waste!" Beltan protested. "In Hispan we require no army. Nor have we any problem of surplus population. Surely Harg is sufficiently advanced to control its birth rate according to its needs."

"The soldier's trade," interposed Kleon haughtily, "is the noblest trade of all. The mere practice with weapons —man's weapons, that is, like the sword, the shield and javelin, and not such cowardly things as kill at a distance— the ordered evolutions, the discipline to mind and body, the inurement to hardships, make the man something higher than the slinking beast. The godlike Plato himself placed the warrior class

next only to the philosophers in his ideal State."

"Behold ten thousand years of evolution," Sam grinned affectionately at the handsome Greek. "A complete cycle that returns on itself. In Hispan Kleon felt kinship to the Olgarchs; and here before this strange city of Harg he makes his *apologia* for the totalitarian State. I think there is Spartan blood in his veins as well as the more subtle Athenian."

Kleon scowled angrily. He took this jesting in ill part. But the Olgarch stayed the gathering storm with his exclamation. "See, my friends. Something else is about to take place."

Hanso's voice resounded in the amplifying crystal. "And now," he thundered, "for the last, the ultimate maneuver. Take off, brave soldiers of Harg. Soar and wheel like birds in the sky; prepare against the Day!"

The three watchers gasped.

Around each motionless soldier an elongated bubble grew, lifting paper thinness from the stellene surface, rising rapidly, enfolding him in a sausagelike transparency. A hundred thousand airy bubbles, swaying gently in the wind, each with green and yellow-uniformed warrior enclosed, armed with stellene weapon, and filled with oxygen from a generating pack strapped to his back.

A moment they swayed, held only to the surface by a taper of molecular stellene. Then, at a signal from Hanso, thin streamers of fire licked out from tiny capsules of fuel attached like spurs to each man's boots. The tapers burst with little pops. The mountains filled with soft roaring sounds. The flames lengthened, shifted from red to blue dazzlements.

A hundred thousand elongated bubbles, and a hundred thousand men, catapulted upward to the sky, high above the looming Andes, straight into the sun that was directly overhead. Higher, higher, until they were but remote specks in the blue, and the heavens seemed to be aflame with meteor trails.

"Good God!" Sam ejaculated. "Individual rockets! Things that we were just beginning to play with in our time."

Kleon knew no fear, yet he fell back. "Icarus come to life again!" he breathed.

Only Beltan maintained a faintly contemptuous calm. "Crude affairs," he observed. "Hispan discarded rockets a thousand years ago. *We* tap earth's electro-magnetic fields for our power."

Sam squinted upward. "Nevertheless," he muttered, "a terrible weapon in the hands of a totalitarian state. Yet to what end? Obviously Harg believes itself the only city remaining on earth. Why then this martial upkeep; these senseless, complicated maneuvers?"

He interrupted himself excitedly. "I have it," he cried. "A Fascist state exists only for dreams of conquest. Only so can the leaders justify themselves, their ruthless control, to the mass of their people. But Earth seems sterile. Perhaps a hasty expedition has so reported. By a stroke of genius Hanso and his predecessors have turned their subjects' attention to the skies. Beyond lie other worlds. Mars, Venus, the satellites of Jupiter! In my day we thought them inhabited. Very likely they are. What greater fillip to enthusiasm, to present contentment, than to raise their eyes to the heavens, to show them illimitable vistas of glorious conquest?"

Already the rocketing army was but a mere tracery of darting fires. It had burst the bounds of earth's atmosphere, had catapulted into outer space.

"An insane ambition," Beltan said. "Even should Harg succeed in reaching Mars, what benefit would such an alien conquest be?"

Sam grinned. "I could answer that by asking you what benefit the workers of your Hispan derive from their lives."

The Olgarch shook his head. "I pre-

ferred to share your hardships," he remarked quietly, "rather than remain."

Kleon, the Greek, cried impatiently: "Neither of you understand. I marched with Alexander into Asia to bring the blessings of Greek civilization to the barbarians. When we reached India there were tears in his eyes. He had achieved the ocean, the limits of the world. He sighed for more worlds to conquer. Had he but known——"

Down from the heavens they came, swooping with furious acceleration. It was spectacular; it was awe-inspiring. The sky seemed to be ablaze with cometary fires.

THEN the bubbles took shape and form. Glittering transparencies, each with its green and yellow occupant, stellene-tipped tube extended before him in triumph. A mighty armada such as old Earth had never before witnessed in millions of years of distorted evolution.

They grew on the sight. The three men stood motionless, shielding their eyes from the blinding vision. So intent were they on the fiery rain they did not realize that they had incautiously moved closer to the precipitous overhang; that they were erect and exposed to the view of the uplifted surface of Harg, not a hundred feet beneath.

Hanso saw them; so did his silent compeers. Astonishment darkened his sallow face. His eyes bulged even more than before. His foot moved over banked buttons. It pressed. At once a thin, keen whistle shrilled through the air, penetrated the throbbing roar of a hundred thousand shooting rockets.

Sam jumped at the sound, cried: "Duck for cover!" But it was too late.

Already battalions had swerved, were plummeting straight for them like hawks on their prey. In a trice they were enringed by settling stellene bubbles, through whose sheerness blond, fanatic faces stared at them, and bulb-tipped tubes pointed threateningly.

Kleon lifted his gleaming shield involuntarily, held his javelin ready for the strike. Sam Ward's hand leaped for his holstered gun. But Beltan made no move for the electro-blaster that dangled at his side. His voice rose in warning; calm, unperturbed.

"We would be dead men before we could kill even one of them. It is wiser to let them take us to their master, Hanso."

Sam groaned, and took his hand from gun butt. The Olgarch was talking sense. Only Kleon lowered his javelin with resentful gesture. It was not in his nature to surrender tamely.

"Bring them to me," floated up the sharp, high-pitched voice of Hanso.

The stellene tubes thrust strangely through the enveloping bubbles, prodded the three captives roughly toward the edge. Sam swore in sheer amazement. The transparent coverings seemed to offer no resistance to the passage, yet when he accidentally stumbled against a soldier, the outer surface was hard as stone to touch.

"That," murmured Beltan, "seems to be a property of the stellene alloy. Our technicians found that out even in their tiny samples. It is a uni-way crystal. The molecules lie in polar planes. On one side they form an impenetrable lattice of diamond-hard surface, but on the other their planes diverge so as to admit exit—but no entrance."

"I get it," Sam nodded. "Something like the rat traps or lobster traps of my time. It is easy to get in, but impossible to get out."

Kleon staggered suddenly back. "By Zeus and Poseidon, do these fellows wish to cast us over the cliff?"

They had been prodded to the very edge, and the icy tubes were relentless in the small of their backs. Beltan smiled his slow, calm smile. "Do not fear, friend Kleon," he told him. "Allow yourself to drop to the surface of Harg. You will not be harmed."

Suiting action to words, he stepped over, whizzed out of sight. Sam shivered, followed. The Greek gaped, called on his gods, and leaped bravely.

It was a sickening drop. Yet even as they seemed about to smash upon the hard, bright surface, Hanso pressed another button. Waves of force swirled up to meet them, cushioned their fall to a gentle, feathery descent. They stood upright, unharmed, before the gigantic bubble that housed Hanso and his two associates, while all around them, immobile once more, their space-protective stellene shells removed, clustered the huge army of Harg.

The eyes of Hanso glittered upon them. "Who are you three," he demanded, "similar in some respects to the men of Harg, yet strangely different, even from each other? How have you come across the outer wastes where no being has come since time immemorial?" He leaned forward slightly as he spoke, and a strained eagerness showed in his sharpened features.

"It is a long story," Sam started slowly, fumbling for delay. He did not like that sense of strain, of eager waiting for his answer. But Beltan added quietly, "And a strange one, Hanso. I am Beltan, an Olgarch of Hispan, a city to the north. We, too, had thought ourselves the sole survivors of the human race since the cataclysm of the twenty-seventh century. My comrades are sleepers from forgotten times. Kleon, he in the once glittering armor, now rusted over with the steam of many jungles, was born ten thousand years ago. Somehow he found the secret of arrested animation, immured himself for transport into the future. This other, Sam Ward, whose tongue was the root of yours and mine as well, lived in the twentieth century. By accident he stumbled on the secret place of Kleon, himself succumbed to the radium-impregnated gases. He slept on with the other.

"Digging in the foundation of Hispan, we found the sleepers. We had thought the outer world a sterile waste, inimical to human life. They thought differently. By their unwonted freedom of tongue in our carefully balanced city, they forfeited their lives. I, myself, was weary of inanity, of monotonous nothingness. I cast my lot with them, and we escaped. For months we have wandered, coming to believe the legends correct—that Hispan alone existed on all the earth. Now we have come to your city of Harg. There are no others."

III.

SAM RELAXED. He had tried by surreptitious means to stop the Olgarch in his narration; and he had failed. Now he understood his seeming blundering. Hanso was no fool. No possible evasions would have held from him the knowledge that there was another existing civilization on the face of the Earth. By his obvious frankness in disclosing the whereabouts of the neutron-enclosed city of Hispan, Beltan had cleverly given the ring of truth to his last assertion. And, in fact, as far as the wanderers knew, there was no other city.

A shadow clouded Hanso's face. His eyes turned to his associates. "You have heard, Verdu, and you, Balan. These men have unfolded a strange tale."

Balan, to the left, was the slighter of the two. He glanced meaningly at Hanso. "There is at least this city of Hispan to be investigated, High Magnificance."

"It will prove of little avail," Beltan interposed calmly. "Hispan has been at peace for thousands of years; it has no soldier class. Nor does it require one. Its neuton walls protect it from even your mightiest weapons."

Hanso's eyes flicked out on his motionless warriors, their ominous array.

"That remains to be seen," he murmured.

Vardu, to his right, was taller, swarthy, grim of visage. His mustache bristled coarsely. "I think," he said reflectively, "since there is a Hispan where we knew of none, there may be other cities." A shrewd smile flitted over his countenance. "Perhaps they are not as well shielded from attack as the city described by this stranger."

"There are no others," Sam burst in positively.

"How do you know?" snapped Vardu. "Granted that you tell the truth, have you covered all of earth in your wanderings?"

"No, but——"

"Enough," decided Hanso. "We shall discuss these things later. In the meantime provision must be made for our guests within the city of Harg. Balan, that will be your task."

"Does that mean we are your prisoners?" Kleon demanded boldly.

Hanso's eyes glinted with little lights. "Our *guests,* I said—until we determine otherwise."

Balan moved out toward them. He passed through the thin-blown stellene as if it did not exist. Yet behind him, as he emerged, the transparent wall seemed intact, undisturbed.

"Come!" he said, and led them toward an open area. Even as they stood motionless at his command, Sam noted the fine circular line in the otherwise smooth surface around them. Balan pressed with his foot.

Swiftly, smoothly, the circle descended into the depths; above, the roof swirled unbroken into place. They were in a hollow shaft, dropping downward with breathtaking velocity. Down into the very heart of the many-tiered city of Harg. But the walls were opaque, disclosing nothing of the crowded life that lay beyond. The milky substance blurred with the speed of their descent.

Sam glanced surreptitiously at their guide. Balan had seemed to him the most human-looking one of the three, even as Vardu appeared the one most to be feared, though he was subordinate to Hanso. Balan caught his glance, smiled. It was not a pleasant smile, yet it was not too forbidding.

Encouraged, Sam asked questions. "It was an amazing sight to us," he observed, "to see Harg emerge suddenly from the flat level of the valley. In the time from which I come, no such feat would have been possible to all the resources of our science."

BALAN looked pleased. He was not immune to flattery. "The scientists of Harg are the best in the universe," he admitted. "They are under my control, even as the warriors belong to Vardu, and the providers to Gama, whom you have not seen. Of course, His Magnificence, Hanso, is the All-High. But the method by which Harg is lifted into the mountains, and retracted again into the bowels of the earth, is simple enough. It was evolved in the distant past, before the smash-up, when Harg was still a city-state enringed by hostile nations intent on changing our beneficent institutions. We were small then, and lacking in manpower. It was necessary to hide from the overpowering armies of our enemies, to escape destruction. This was in the rule of the first Hanso. Our scientists labored long on the problem, with that undeviating devotion which has always been Harg's boast.

"They solved it by burrowing underground, by building our city afresh within the bowels of the earth in the form of a tall, many-tiered cylinder. At first the structure was crude, but later, with the discovery of stellene, and its many wonderful properties, the city was rebuilt entirely of that material. Thereby we escaped the notice of our enemies, and prospered mightily under the beneficent guidance of a line of Hansos

and the blessings of our ordered state, where each man and each woman knows exactly what he or she must contribute to the general total, and labors willingly and gladly to that end."

"But you haven't answered my question about how Harg is raised and lowered," Sam protested.

"Oh, that!" said Balan. "That is very simple. Purely a matter of hydraulics. We rest upon a huge cylinder that taps an underground lake. When we wish to rise into the outer air, pressure upon the lake forces the water into the cylinder, is multiplied by the surface area of the piston within, and lifts us up the outer walls. When we wish to descend, we permit the water to return to the lake."

Sam nodded. "We, too, had hydraulic elevators based upon the same principle in our day," he observed. "But the total weight of your underground city runs to millions of tons. That requires an initial pressure of enormous proportions. Where do you get your power from?"

"We tap the inner fires of earth," Balan explained. "A bore runs almost twenty miles down, contacts a pocket of lava. A lock arrangement permits this to rise swiftly to the lake. The water converts instantly to steam, expands with unimaginable pressure. On withdrawal of the lava, it cools, condenses, and turns to water again."

"I would like, if possible," said Beltan suddenly, "to see those whom you call the providers. No doubt they correspond to the workers of Hispan. We have only three classes in all—the olgarchs, the technicians, corresponding to your scientists, and the workers. You have four, if we count the four rulers, you named as a class."

"There are more than four of us," Balan corrected. "I mentioned only the highest overseers. But there are about five hundred in all, whose function in the state is to oversee and supervise, to the tiniest degree, every activity, every movement, every thought even. This is to make certain that no one, warrior, provider, scientist, or hetera, disturbs the smooth efficiency of our organic entity."

"The Fascists of our day would have died of envy if they had known of Harg," Sam muttered. "They but blundered toward what is here in full flower."

But Kleon, weary of these metaphysical discussions, had pricked up his ears at a name to which the Hargian overseer had casually alluded.

"Hetera!" he exclaimed. "That has a familiar ring! What or who are they?"

BALAN scowled. His erstwhile good nature evaporated. He bit his tongue in manifest vexation, as though he had unwittingly let something slip. "You are mistaken, stranger who have slept for ten thousand years, I mentioned no such creatures."

"But you did," the Greek countered with reckless insistence. "Now in my day the Heteræ were——"

"I am not interested in your silly tales," the overseer said savagely. "Your wits have been woolgathering during your lengthy torpor."

The Greek flushed. He jerked for his javelin. Balan grinned sourly, plucked at an inconspicuous button on his gray tunic.

The Olgarch thrust himself between them with hasty words, while Sam, cursing the triggerlike imprudence of the Greek, streaked for his gun.

"Kleon!" said Beltan with stern impatience, "you are a fool! Friend Balan is quite right. He never mentioned that outlandish word whose very sound I have already forgotten."

"But——" the other protested in bewilderment. "I was certain——"

The Olgarch turned swiftly to the Hargian. "I repeat," he said silkily, "if

it be not forbidden, I would like to see your civilization. It seems even superior to that of Hispan, my native city."

Slowly Balan dropped his fingers from the button. His dark passion faded under the subtle flattery; he even smiled. Sam breathed easily again. Once more Beltan had shown quick-wittedness. "Your tongue," he growled low to Kleon, "will still get us into trouble."

"Of course," bragged the Hargian. "Our state is perfect; it would be impossible for any other to surpass perfection." He hesitated a moment. "There is no reason," he decided at last, "why you may not see parts of Harg." He grinned unpleasantly. "There is small chance in any event that Hanso will permit you to leave us soon."

IV.

THEY HAD BRAKED soundlessly to a halt at the very bottom of the shaft, three thousand feet within the bowels of the earth. Sam could hear the surge of subterranean fires, the thin hiss of steam, the muted rush of falling water.

"The maneuvers are over," Balan explained, "and the city is dropping back into the earth. Just in case," he added significantly, "there are others of your kind scouting over the mountains. They could pass a thousand times and never know that Harg lies hidden in this valley. Now I shall first take you to the section of the providers."

He touched the second inconspicuous button on his tunic. It glowed redly. A section of the enclosing wall leaped into eerie life with answering glow, then faded into glassy transparency. They walked through, and the opaqueness merged into position behind them. But even as Sam stared sharply around, his thoughts were troubled. He was mulling over the hints which these overseers, the apex of the power pyramid for this totalitarian state, had dropped. They had been preparing for the Day! Those hundred thousand fanatical warriors in their gaudy uniforms, with their rocket shells, and terrible stellene weapons, were not training for mere show. Before their arrival, that martial lust for conquest had been directed toward outer space, toward the distant planets; but now that they knew that at least one city existed on Earth, now that the shrewder Vardu suspected others as well, Harg would not rest content. The very nature of a Fascist regime forbade peaceful relations with neighboring states. And the three wanderers, the only three in all the world who might spread warning of impending attack to possible unsuspecting civilizations, were helpless prisoners. Sam had no illusions about their status. The term *guest* employed by Hanso was wholly ironic.

The section of the providers filled all the lower tiers. They tended the hydraulic pistons, the apparatus of the lava locks; they dug through shafts into the surrounding rock for the precious metals and minerals required for their economy; they looked like huge blond gnomes before the blazing atom crushers; they tilled the lush beds of dissociated food stuffs.

"Matrices, really," Balan explained. "What looks like soil are carefully prepared beds of essential elements." He pointed to huge parabaloid reflectors overhead, from which multicolored rays beat steadily upon the artificial soil. "We no longer have to eat the coarse bulk that nature provides in animal and plant stuffs in order to gain the tiny residuum of required essences. Here they are grown at will, activated by the special intensities of the reflectors. The thirty-two different types of vitamins, the seventy-five hormones, chloresterols, sugars, purified proteins, hemoglobins, are crystallized in their essential states. The diets are rigidly worked out by our scientists. Each dweller in Harg receives the exact amount, the exact pro-

portions suitable for his body economy —no more, no less. *That* is efficiency."

THE PROVIDERS did not lift their heads from their tasks at the intrusion of the strangers. Curiosity was obviously not permitted them, nor cessation from work. They were giants, a uniform six-foot, three inches in height, powerful of body, knotted with muscles. Not a one of them but could crush Sam or Beltan or Kleon in contemptuous hug. But their broad blond faces were vacuous to a degree; their eyes without luster. Men and women worked side by side, dressed alike, performed the same strenuous tasks.

"They seem to work without ceasing," Beltan observed. "Yet they are brawnier and stronger by far than the workers of Hispan. What is there to prevent them from revolting against their overseers?" He pointed to the few small, dark, quick-eyed men who strolled leisurely through their innumerable ranks, pausing only to give an occasional sharp command which was received with eager subservience.

Balan looked surprised. "Revolt?" he echoed. "There never has been any. There couldn't be. Each member of Harg knows his exact status in the unitary organism of the state; any change is unthinkable. Besides, they are all bred—workers, scientists, warriors, yes, even ourselves as overseers—for their especial niche. There is no guesswork."

"You mean birth control?" Sam asked.

The Hargian smiled. "Pre-birth control," he retorted. "But you shall see that later in the laboratories of the scientists. But don't think that there is any repression. We need none. Everyone is content. For example, the providers are in three shifts—a working shift, a sleeping shift, and a playing shift. I'll show you how they play."

He led them by swift elevator to another tier. This was a huge playing field, extending over the entire round of the underground city. It swarmed with shouting, shrieking providers, nude except for a loin cloth about their middles.

There were running tracks, gymnastic apparatus of intricate design, what seemed to be a football field except that there were hundreds on each side, and the ball was an illuminated sphere that floated in the air like a balloon. The players swung overhead on flying rings, kicked at the ball with their feet, pushed it along with wriggling bodies toward the goal, piled up in inextricable masses high in the air, from which the lighted globe would suddenly emerge with violent propulsion; they fell in droves to the padded floor beneath, and swarmed up ladders again to seek new grips on the hurtling rings.

"Wow!" breathed Sam, as he watched the semi-naked players fall with bone-jarring thumps, heard the savage crack of brawny fists on intervening skulls, saw the blood stream from sweaty, pulsing bodies. "And we used to think ordinary football rough going! But don't they get maimed or killed?"

"Often," Balan said indifferently. "It does not matter. We can always incubate more. And it hardens them, makes them immune to the wasting labor of the mine shafts, the blazing heat of the atom crushers. They love it."

One of the players flew suddenly out of the overhead mêlée, dropped with a sickening thud to the ground. Blood covered the battered face, a leg was twisted underneath. Then the wounded player lifted himself painfully, crawled away, the right leg dragging uselessly behind. But the game did not stop its furious pace, nor was any attention paid to the sufferer.

SAM jerked forward with a little oath. He had seen certain indications on the half-nude body. "Why, that's a

woman," he gasped, "and her leg is broken."

Balan shrugged. "What of it?" he said. "The providers work and play alike, women and men. There is no love, no mating. They are sterile. As for the one who is hurt, she will crawl to the medical tier. If her wounds heal properly, she returns to her tasks; if not, she is liquidated."

"Liquidated?" Sam stood with clenched hands, seeking to still the anger that invaded him. "You mean *killed*."

"We prefer the former word," the overseer answered. "Each individual in Harg lives only for the greater glory of the whole; once his usefulness is over, he must give way for newer and more vigorous units."

"A horrible philosophy," Sam said slowly.

"Why do you call it horrible?" Kleon asked in surprise. His eyes had glittered approvingly on the brawny, muscular bodies of the contestants, on the rude sports they played. To one side two providers were wrestling. Huge, equally matched. Straining and panting, they clasped each other round the waist, sought to gain the final stranglehold. Suddenly, one shifted his hold, caught the other in a combination headlock and flying mare. There was a little snapping sound; then the victim whirled high into the air, went crashing to the floor. He remained there, limp, unmoving. But the victor stood proudly erect, seeking praise from the onlookers, displaying the sweaty contours of a nude form.

The victor was a woman!

"At least," continued the Greek with animation, "they develop sound bodies, if not exactly sound minds. Our gymnasia, our Olympic Festivals, our Delian Games, witnessed similar scenes. Men and women competing together, forgetful of their sex in the hard rush of bodies. The Spartans were even more rigorous. Maimings and deaths were not unknown."

"I think we have seen enough of this," the Olgarch said with a certain calm distaste. "In Hispan we do not go in for feats of strength. We think them relics of more primitive eras." Besides, he had noted the withheld anger of Sam, wished to get him away before there was a dangerous explosion. "May we go to the laboratories of the scientists?"

The overseer stared at them superciliously, said: "Very well!"

The section of scientists extended over a dozen tiers. Laboratory on laboratory, each devoted to specified problems. In one, research was proceeding on the efficiency of atomic disintegration; in the next, new uses were being sought for the all-pervading stellene crystals; in the third, red flares of destruction licked interminably between the poles of humming diskoids of revolution; in still another, rocket reactions were carefully studied in test chambers. And everywhere was giant apparatus, bewildering in intricacy, overpowering in size and function, that left Sam gasping. Though he knew something of twentieth century science, this was beyond his depth. As for Kleon, he stared around with a certain disdainful hauteur, as though these things were beneath a Greek trained to arms, to philosophy, and to the surges of the poetic spirit.

Only Beltan was keenly interested, asked clear-cut, intelligent questions of the tending scientists. They were somewhat of a shock to Sam. Slight, pale, spindly-legged, with bulging foreheads and long, delicately adjusted fingers, they bent to their work with undeviating absorption. They answered Beltan with short monosyllables; only sprang to profound attention when Balan, their head overseer, addressed them with curt commands.

Slowly a picture took shape and form in Sam's mind from the maze of experi-

ments. "Your science is tremendously advanced," he admitted, "but it seems entirely on the practical side. I see no theoretic experiments, no attempt to solve the fundamentals of life, of matter, for the sake of pure knowledge."

The Hargian laughed scornfully. "Pure knowledge?" he echoed. "Moonshine, dreamy stuff unworthy of our state. Of what benefit would it be to Harg to discover, for example, that the universe is expanding or contracting? It does not affect our lives, or the future of Harg, one way or another. It never will. We restrict our science to the immediately practical, to the things that will make Harg mightier, more glorious, more efficient. *That* is the only purpose of science."

"But the things of the spirit," Sam protested. "The desire for the ultimate truth!"

"There is no ultimate truth," Balan retorted rudely, "except the single truth of Harg! All other lesser truths must conform themselves to that one overwhelming fact."

"Here too," Beltan interrupted quietly, as he always did when Sam or Kleon showed argumentativeness, "I see that men and women alike are scientists. I even noted the same among the warriors. Are they also sexless?"

"Certainly. Sex would prove a disturbing factor in the ordered regime of the state. There would be incalculable interruptions, passions, losses of energy. So we sterilize them at birth. It would be much better if we could evolve a wholly neuter gender in the incubating eggs. It would tend toward greater efficiency, would avoid those small periodic weaknesses that come even to our sterilized classes, and curtail their production. So far we have not succeeded; but the work is going on, and I have hopes of an early solution."

"But if you did succeed," Sam argued, "how would you continue to reproduce, to replenish the race?"

BALAN SMILED. "I did not say," he replied with a smug grin, "that the overseers are sterile." Then he stopped short, and shunted them hastily into the final laboratory. "Here," he said, "are the incubators, where the fertilized eggs are molded by properly regulated strengths of cosmic rays to breed the types we desire. Thus there is never a surplus of any class. Births are nicely adjusted to deaths. Or," he added significantly, "we can increase at will the numbers of a particular type—the warrior class, for instance. Adult growth under our forcing machines is achieved within a week."

"Meaning Hispan?" Beltan asked quietly.

"Meaning Hispan, or the planets, or any other state that may exist," Balan retorted unpleasantly.

"I would like to see these forcing machines." Sam moved quickly.

He had heard enough to cause his jaw to harden, his eyes to grow grim and taut. His hand lurked close to his gun. An idea had sprung full-born in his brain. If he could get to those devilish machines, wreck them somehow, he might retard sufficiently the obvious plans of Harg. By their presence he and his comrades had directed attention of this perfected corporative state to the possibility of other civilizations on a supposedly uninhabited earth. The conviction had grown in him that Hispan and Harg were not all; there must be others, unsuspecting, more in line with the evolutionary ideas of the twentieth century. They would be conquered with ruthless force, warped to slavery. He must prevent it, even at the sacrifice of his own life. Perhaps, in the resultant confusion, Beltan and Kleon might effect their escape, give warning.

But even as he moved, a side panel grew transparent, emitted a taller, darker figure. Sinewy fingers closed around the second tunic button.

"Stay where you are," said a voice.

Sam froze in his tracks. So did the others. Whatever the lethal qualities of the rays that round disk could emit, they realized the power would be sufficient to blast them all out of existence before they could lift a finger.

"That is better," remarked Vardu,



From far behind came an ominous whispering whine—Vardu was in pursuit.

overseer of the warriors. His saturnine features turned icily on Balan. "Why were these creatures of an inferior order not confined in the prison chamber, in accordance with the commands of Hanso?" he demanded.

The overseer of the scientists paled. "But His Magnificence merely said——" he started to protest.

"You do not understand the orders of Hanso," Vardu interrupted brusquely. "It is not the first time."

"Yes, Vardu," Balan said obediently. A sullen hate lurked in the corners of his eyes. Sam, alert for any break, noted the elements of discord between the Hargian Chiefs, noted also that Vardu was the more arrogant, the more powerful.

"Good!" said the taller one. "We understand each other now. Hanso gives commands; I interpret them. Since that is clear, take these alien spies to——"

Through the still open panel another figure emerged. A woman, resplendent in all the trappings of her sex, voluptuous, beautiful.

The sight of her seared through Sam, set his pulses leaping. Dimly he heard Kleon's whispered: "The Goddess Aphrodite!" Even the Olgarch, proudly reserved, gave a queer little gasp.

Her limbs were the hue of rose-petals, warmly curved. A shimmering garment of sheerest thread flowed over her molded form, accentuated rather than concealed the beauty of her body. Her bright golden hair was caught up in a net in which precious jewels glittered like fireflies. Her eyes were wells of blue allure.

SHE moved with a studied grace; her red lips pouted. She had not seen the strangers. "I heard your voices, Vardu and Balan," she said languidly, "raised in quarrel. Since the wall that hems us in was fortunately open, I came to see——"

Vardu recovered himself first. Black anger struggled with a certain leaping boldness in his gaze. "Alanie!" he rasped. "You know you are forbidden to leave your quarters. Go back——"

Alanie surveyed him with an insolent detachment. "I overheard you say to Balan," she said softly, "that the great Hanso gives commands, but that you interpret them. Perhaps Hanso might be interested to hear of that arrangement."

Balan took a sudden step forward. "Why, isn't that so?" he snarled. "Then Vardu——"

"Shut up!" the overseer of the warriors said furiously. He turned on the woman in a cold rage. "You wouldn't dare, Alanie."

"Oh, wouldn't I?" she laughed. "And perhaps I wouldn't mention certain advances which you proposed to me. I, Hanso's mate."

Vardu collapsed. All his arrogance left him; fear crawled in his eyes.

"Alanie! You have mistaken; it is not so."

Her voice cracked out like a whiplash. "Then say no more of my disobedience of the law. I am tired of my immurement with the Hetera. They bore me with their vapid chatter, their aimless waiting for condescending visits. I wish to wander, to see things——"

She turned petulantly, and her eyes widened. She had seen the strangers, themselves transfixed with her beauty. The pulses still hammered in Sam's veins. Hetera! Alanie! Now he understood the meaning of much that had puzzled him. In this state of the future the masses were ruthlessly divested of sex, of all the physical, mental and spiritual overtones that accompany that mighty manifestation of nature. Sex, they had been told, was only a disturbance, an impediment to efficiency.

But hidden from the gaze of Harg was the harem of the overseers—beautiful women, voluptuous beyond belief, ministering to the pleasure and delight

of the rulers. Sam knew now the origin of the ova under the cosmic ray machines and in the forcing chambers of the scientists. Even in the twentieth century there had been talk of the possibility of incubation.

Alanie's gaze swept curiously over Sam, lingered a moment on the Olgarch, then fastened with avid fixity on the classic, golden features of the Greek.

"Who are these men?" she asked softly. "And what especially is the name of this one with the face of a superman?"

Balan's sallow countenance lit up with a certain triumph at the helpless fury of the chief of the warriors.

"They are aliens to Harg, oh, Alanie!" he volunteered. "They came from that outside world which we had always thought barren of human life. They are named Sam Ward, Beltan, and he of whom you ask especially is Kleon, of ten thousand years ago."

"Kleon!" she rolled the name on her tongue, stared at him with speculative eyes. "I have not seen his like before. He is indeed—a man."

No doubt of that, Sam thought. Compared to the sexless masses of Harg, to the sallow-faced, bulging-eyed masters. Then he glanced warily at his comrade, and received a shock.

V.

KLEON had forgotten him, had forgotten Beltan, had forgotten everything but the beauty of the woman before him. His soul was in his eyes, and his eyes were fixed with a burning intensity upon Alanie.

A sudden fear clutched at Sam's heart. "Kleon!" he rasped. "Be careful! Remember all our hardships together!"

Beltan strode swiftly to his side. His tawny hair was an aureole. His careless face was rigid with concern. "Have you lost your wits, oh, Greek? Are you in truth a primitive without reason? Can't you see——?"

But Kleon paid no heed. His glance locked with that of the woman. "Alanie!" he murmured. "You are indeed beautiful."

She smiled a slow, tantalizing smile. Her eyes clung hungrily to his lithe, straight form, his face as cleanly carved as a medallion. "Come with me, Kleon," she whispered.

Vardu crashed forward. "Alanie, are you mad?" he snarled. "You know this is against the law! You know the penalty of disobedience! Get back to quarters before——"

She looked him full in the face, mockingly. "You forget, mighty Vardu," she said with ironic emphasis, "His Magnificence. If I but whispered to him the things I knew——"

His face became an inscrutable mask. "Very well, Alanie. As you wish. Take this alien with you; I shall not hinder you."

"That is better," she laughed. "Now we understand each other. Come, my Kleon."

He went with her, shield and javelin dangling from left hand, sword slapping at his legs. Through the open panel they went, disappeared behind its swift opalescence. Not once did he look back at his comrades, or betray an awareness of their existence.

Beltan's lips were set in a painful smile; sodden despair overwhelmed Sam. He had come to love the Greek; now he had deserted them without a qualm; deserted them for a Hetera, a plaything, a woman of Harg!

Dully he turned at Vardu's harsh command, dully he permitted himself to be herded with the Olgarch into the communications shaft again. The whispered muttering of Vardu and Balan made but little impression—they seemed to have come to some private agreement between themselves—even the swift clouding of the confining walls was an unimportant thing. Kleon had deserted them—that was the sole fact!

But Vardu's sardonic voice ripped him out of his maze. "Everything works into our hands, Balan," he chuckled. "Now that we have joined forces, it will be an easy matter. . . . Do you hurry and inform Hanso of the treachery of Alanie with this primitive stranger. I shall await him in a hidden niche close to the quarters of the Hetera.

"In his fury he will slay them both. Her mouth will be forever stilled. But at the very moment I shall loose on him the needle ray that makes a gaping wound somewhat like that of the javelin in the Greek's hand. I can claim thereafter to the overseers that they slew each other simultaneously. Meanwhile, after your warning to Hanso, you will return and put these others to the death. And I shall marshal my warriors, inform the overseers that the aliens had admitted before they died that there were many other cities over the Earth whose conquest merely awaited the presence of our armies. In their enthusiasm they will forget to question; we shall become Magnificences together; and Harg shall gain new provinces, new slaves."

THEN they were gone, and Sam whirled on Beltan within the confines of the narrow prison cell.

"Did you hear their fiendish scheme?"

Beltan stood quietly by his side. "There is nothing we can do, Sam Ward," he said patiently. "We are helpless within these stellene walls, even though they have overlooked our weapons. Not even my electro-blaster can pierce their substance. Though it hurts me to say so, for I loved him well, Kleon has brought this upon us all."

Sam flung away in anger. "He could not help himself," he exclaimed. "The emotion of love, of overpowering desire, no doubt was bred out of Hispan in the long course of centuries. And no doubt the lack of it helped contribute to the general flatness and tameness of your existence."

The Olgarch brooded on that. "Perhaps you are right, Sam Ward," he said finally. "I have unjustly accused poor Kleon!" Then he smiled. "After all, perhaps he is better off than we. At least he will have had a lovely woman in his arms before he dies; while we—we shall die without that subtle consolation."

But Sam's face was flattened to a transparent strip—a windowlike projection, inset within the darker translucency of the all-pervading stellene. Their prison gave on a huge, upward slanting passageway, obviously the chief connecting thoroughfare of Harg, for the transportation of larger masses than the vertical shafts could accommodate.

There seemed an unusual commotion. Giant providers, blond of hair and muscular of body, hurried by in endless streams, bowed under the weight of strange mechanisms, of packed equipment. Warriors marched along with echoing tread, in companies and battalions, right foot up, left foot down, lackluster faces turned each to an exact angle, obeying an invisible will, terrible in their colorless uniformity. Each held erect the stellene weapon that blazed red destruction at a touch.

The great passageway trembled with their march; interior galleries spewed their contents to join the upward moving stream.

"It looks like a vast migration," Beltan commented.

But Sam shook with an indefinable fear. "It is more than that," he declared hoarsely. "It means that the plans of Vardu and his dupe Balan have been successful. It means that Kleon is slain; that Hanso has fallen into the trap. It means that Vardu has assumed control, and has mobilized all of Harg for the Earth-conquest by means of which he seeks to justify his seizure of power to the overseers."

The Olgarch shrugged. But the pain in his eyes belied the lightness of his

voice. "If Kleon is dead, so shall we be very soon. As for Earth, we know only of Hispan. And Hispan is impregnable behind its neutron walls."

"Perhaps!" retorted Sam. "Though we do not know the full power of destruction inherent in those stellene rods. But I am convinced there are other civilizations scattered over Earth, hidden, unknown as yet to each other. It is incredible that alone of all man's strivings, his idealism, these two twisted, vicious cities should remain. There *must* be others, different, more worthy, more in consonance with the trend of upward progress."

"Evolution does not necessarily mean *progress,*" the Olgarch said quietly. "It only requires *change*—and that may be for the worse. But what can we do to stop the hordes of Harg?"

"Escape! Give warning!"

Beltan smiled. "Easier said than done."

"We escaped from Hispan," Sam said grimly.

"You forget I helped you. Here we have no outside aid."

The American relapsed into gloomy silence. He turned his face once more to the dreadful monotony of those inexhaustible hordes on the march, thousands, millions it seemed, steadily streaming to the exterior, spewing out to conquer an unknown planet.

He clenched his hands in helpless wrath. Kleon was lost to them; and now the earth, that had beckoned with strange mysteries, as well. Their own lives were forfeit. Yet there was nothing they could do. Beltan was right. The stellene walls were impenetrable.

THERE WAS a sudden break in the endless lines. A gap in the solid ranks. Balan, overseer of the scientists, strode heavily down the path. A smug, self-satisfied air wreathed his sallow face. His tiny mustache bristled with importance. The warriors, the providers, flattened obsequiously against the walls at his approach. He was of the mighty.

He halted before their prison cell, tugged at the top disk on his gray tunic. It glowed cherry red. Swiftly Sam's hand leaped for his gun; like lightning the Olgarch raised his small electro-blaster.

"The fool," whispered Sam through taut lips, "doesn't he know we have weapons? This is our chance, as he enters . . ."

The prisoning wall glowed, turned transparent. It shimmered into hazy dissolution. Seemingly unaware, Balan stepped through to his fate.

"Now!" rasped Sam. Two diverse weapons of destruction lifted, aimed at the oncoming man. Fingers pressed on . . .

Sam Ward tried to cry out, couldn't. His finger had tightened—and had frozen in that position. A cold wave surrounded him; made him rigid, immovable. In the grip of a strange paralysis he heard Balan's mocking laugh; saw his hand release the glowing button. The strange light died. By his side Beltan stood as one welded to the floor, the electro-blaster still pointed futilely.

VI.

"YOU MUST think me dumb indeed," Balan jeered. "You forget that the science of Harg is the mightiest in the universe. Every word, every whisper from this cell was transmitted by the ether vibrations of the encompassing crystals to a tiny receiver concealed beneath my tunic. I knew of your weapons, was prepared for them with a tight paralysis beam." His brow darkened. "So you think me the dupe of Vardu, eh? You are mistaken. It is true that he thought so too, tried to use me with fair words. But I have not forgotten his former arrogance, nor my hatred for him. It is he who will prove

the catspaw. Once everything is accomplished, he will die—unexpectedly; and I shall take over the rule of all Harg." His bulging eyes flamed. "Yes, even the overlordship of Earth, of all the Universe."

His thin hand stole to the second button. Sam shrieked his will against immobile muscles, against locked jaws. Death stared him in the face; sudden, irrevocable.

But the paralysis held. Rigid, eyes fixed in an unblinking stare, he saw the button twist——

A faint whine whispered up the passageway. It grew to a thunderous roar. Red flame blasted in a long streak, outlined a hurtling, slender vehicle. At reckless speed it came, propelled by jetting rockets.

It speared through the crowded men of Harg like a flaming sword through melting butter; it left death and destruction in its wake. The huge providers, the fierce warriors, howled and flung themselves into the side passages, fleeing the Juggernaut that crushed and blasted out their lives. In seconds the thoroughfare was clear, except for crisped, unrecognizable bodies, the flare and stench of burning flesh.

A god seemed to ride the fiery steed, a golden-haired god whose face was aflame with battle madness. The rocket vessel catapulted to a halt before the startled overseer. Even as Balan whirled, fingers clutching at the lethal disk, something long and glittering whizzed through the air. The keen point caught him full in the chest. He swerved, staggered, and fell headlong. Bright blood gushed from the gaping hole.

Sam felt swift power flood his limbs once again. "Kleon!" he shouted.

The Greek bent over the hull of his strange vessel, plucked up his javelin in a single motion, grinned. "Hurry, you two," he yelled. "In beside me. Vardu is on my trail."

"But—but——" Sam sputtered. "We thought——"

"Get in," snapped Kleon. "There is no time for explanations."

Beltan vaulted, pulled himself inside. Sam sprang up—just in time. For already the warriors were streaming out again from the merging passages, the deadly stellene rods lifting in their hands. And far behind came an ominous, whispering whine. Vardu was in pursuit.

Sam's Colt barked again and again, and each time a raised tube clattered to the ground, a giant figure crumpled behind it. Beltan's blaster cut wide swaths of blue destruction as he pumped electro-bolts into the swarming hordes. Kleon, a grinning god, once more in his element, whooped his Macedonian war song, hacked with cheerful strokes at the arms that tried to pull them down.

Then he stabbed at the panelled control board. With a roar of jetting rockets, the vessel gathered power, hurled like a thunderbolt up the broad passageway. Once again the warriors scrambled for safety, or were cut down like bowling pins.

SAM looked backward. A faint speck showed far in the distance.

"Vardu is following us," he said.

"He'll never catch us," the Greek retorted cheerfully. "This boat of mine is the fastest one in Harg. Alanie told me so; showed me how to work it."

The Olgarch glanced at him strangely. "We thought," he said, "you had succumbed to her charms, deserted us."

Kleon stared. "The friendship of man for man is more enduring than love for a woman," he answered sternly.

"Why then——"

"It was our chance for escape. I pretended infatuation, made Alanie show me the secret niche of Hanso's private rocket ship. She even was willing to join us. She hates Hanso."

"But Hanso was to kill you, and Vardu to kill Hanso," exclaimed Sam.

The Greek smiled carelessly, manipulated the hurtling vehicle like a veteran rocket pilot. "Alanie saw him come through the secret entrance," he said. "I swung at her warning cry. It was too late to reach for my javelin, or pluck out my sword. So I lunged instead, caught him at the waist. At the same time, Vardu stepped in, needle ray blasting. It smacked Hanso in the back of his skull. He sagged in my arms. I saw Vardu lifting the tube again. I flung the dead Hargian squarely at him. Vardu went down, stunned.

"I wanted to finish him, but the Hetera were shrieking like madwomen, and I could hear the thump of running men. I raced for the rocket ship, called on Alanie to follow me. But she just stood and smiled up at me. 'Go, my Kleon,' she whispered. 'I'll stay and delay pursuit. You'll be better off without me.' Before I could do anything, she had raced to the panel, pressed a disk. A wall rose to shut me off from the quarters, another opened into this passageway. The rest you know."

"Good kid," breathed Sam. "I didn't know she had it in her."

Ahead was daylight, and the slanting rays of the evening sun.

The car leaped through the opening into the valley of the ancient Andes like a meteor in reverse. Up, up it snouted, cleared the frowning ramparts, hurtled high into the reddening sunset.

"Where do we go now?" demanded Kleon.

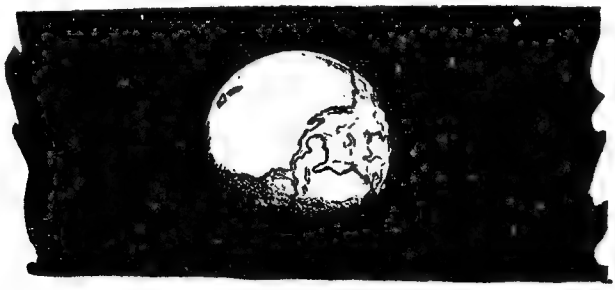
"North!" said Sam, eyes taut with what he had seen in Harg. "To give warning! Hispan is safe from onslaught. The stellene disintegration will not affect its neutron ramparts. But farther north, in what was once my nation, there may be cities, peoples, insufficiently guarded against the fascist hordes of Harg. Perhaps," he added a bit wistfully, "I may even find a people, a culture, more like what we of the twentieth century had dreamed of for this year of 9737."

The Olgarch looked at him with a sidelong glance, but made no comment. Instead, he remarked with a little chuckle, "I am inclined to think that our friend Kleon rather regrets Alanie."

The young Greek shook his head with quiet dignity. There was pain in his voice, longing in his eyes. "She was very beautiful!" he whispered half to himself.

But Sam's eyes were only ahead, straining over the tumbling mountains, searching the shoreless Pacific, seeking in vain some sign in all that tangled wilderness of human habitation, of human striving.

They sped on, ever steadily north. Once more three men, heirs of diverse times, united in past adventures and the grim prospects of future perils!



Invulnerable exile—monstrous invader to earth——

From the Vacuum Of Space

by J. HARVEY HAGGARD

THE short, pompous little man with ludicrous sideburns said, "Call me dictator, emperor or whatever you like." He glanced nervously at the armed guard behind him, then at the newspapermen who were separated from him by a glass partition. "You can tell your readers that I, Jerris Klamath, am the new Mandator of the United States. Within three days the Congress and the cabinet will have dissolved. Under ordinary circumstances I would never have revealed the government officials as mere puppets, but under the present set of circumstances——" He lifted his brows helplessly, shrugged his shoulders. "At present our earth seems unguarded——"

"But," protested an aggressive reporter through a microphone, "it was you who proposed the complete disarmament of 1990. You, personally, were on the world committee that scrapped all implements of war. You——"

"The earth faces an outside menace we never expected could exist," continued Jerris Klamath, purpling impatiently. His features were gross, but compelling. Here was a leader of men—but the wrong kind of leader. "It is a menace from outside space. I am the only one who can save the earth. Tomorrow the army will mobilize at my command. It will gather on my estate at Red Mountain."

"But our earth is without weapons, helpless. The army is practically nonexistent," protested the newspapermen.

Jerris Klamath smiled knowingly. In the hands of the cordon of guards who ringed the inner chamber were slender rod weapons, with curious filaments glowing roseately.

"That's what you think," he retorted. His flat lips pressed together with a smacking expression of self-confidence. His pudgy hands met, finger tips to finger tips. "All the weapons that were destroyed were obsolete. Inform the world that it need know no fear, since I hold in my possession a weapon infinitely more powerful than any they have ever known. Tell them not to be afraid of the menace that draws nearer and nearer each hour from space. The strange being from some distant star that approaches toward the earth will be exterminated. The man who has attracted it here will be made to pay for his utter carelessness."

KRAL, the outcast from a distant star world, was becoming frantic. His leviathan shape hung without motion in the midst of the void. His monstrous spade-shaped head jerked slowly about, peering into the fearful darknesses of space that lay distantly on every side. Now, after what had seemed æons of worming himself through the void by convulsive jerking of his side tentacles, he was beginning to know the pangs of hunger.



A creamy translucency he was unable to understand flashed upward——

He realized now that he must have food, that somewhere out in the bewildering maze of infinitudes he must find some single speck of matter that harbored a sustaining life.

At heart Kral was a coward. Now that he realized that his mother world from which he had come in exile was lost among the tiny pin points of the farflung curtain of space, he knew awful fear that sent convulsive shivers trembling down the bony segments of the triple-ridged back. Each segment of that back structure was as tough as plate armor. The four greenish eyes in the triangular head glittered like evil gems as it swept the heavens again and again, with panic becoming more and more apparent in the spasmodic twitch of every tortured muscle.

The huge denizen from another world would have turned back despite

the threat of certain destruction, yet he knew now, with horrifying conviction, that there could be no returning. Gerylx, his mother world, was lost somewhere in that maze of nebular galaxies. To return would mean death at the caustic spray of blaston rays, for the consulate had promised him annihilation, if he should ever return. Among his own kind, Kral was considered an incorrigible.

The huge folds of his repulsive body were shuddering like primitive jelly. Vast though he was, he could not but feel tiny as compared to the universe stretching about him. Across great abysses of arid desolation he had traveled, realizing that to hesitate in his panic-stricken search would be fatal; and time became dearer with each passing instant. Now the uninviting fragments of a strange galaxy lay farflung about him, with chill eyes of the stars gazing coldly and without pity at this weird intruder from a distant domain.

Suddenly the elongated shield covering stretched taut. The long neck whipped around, and the quadruple eyes became fixed and alert in a new direction. Across an etheric medium which was utilized to convey speech on his mother world, Kral heard a succession of intermittent sounds, sent repeatedly.

He started to shout aloud, to lash his mastodontic body about in the throes of ecstasy. Then a crafty look replaced the dying fear in his malefic greenish eyes. Slyly, he erected the single brush antennæ above the triangular head, and by means of cellular oscillation, sent an exact copy of the curious static hurtling back. A new series of short and long periods ensued. He repeated them. The fangs of the wedge mouth opened hungrily, and all hesitance vanished.

Lurching out with flying tentacles, Kral sent his body gyrating with an odd churning motion across the intervening distance.

IN a distant corner of high-pinnacled New York, a young, firm-chinned man was already battling against the potency of the new Mandator of the world. Hal Stevens braced his body, thrust forth a bunched fist and, after the recoil, saw the man in maroon uniform fall limply to the floor. He turned around with a cry of triumph, but others materialized from the doorway and he was borne struggling against the wall. A blunt instrument bounced across the side of his head and he buckled. The man on the floor was coming dazedly to his feet, his bruised mouth twisting in painful curses. From his pocket he had jerked a curiously shaped rod through whose crystal depths a tiny filament glittered.

"Stand away, men," he ordered wrathfully. "By all the devils of space, I'll melt him out of the void!"

The others, seeing the killing passion in his eyes, fell away. Only a few moments had passed since these men in maroon garb had arrived at Hal's rooms, proclaiming that they were minions of the Mandator, and had come to take him in custody. Hal had sensed their utter callousness, and had refused to go. A furious struggle had ensued. Now, stumbling forward in a helpless lethargy, Hal Stevens waited for oblivion.

It did not come. Behind the minion of the Mandator another figure had appeared, masked behind a gleaming metallic cone. Eyes glittered coldly behind a transparent lens. Stalking forward, a gauntleted fist reached out, jerked the rodlike death instrument from the paralyzed extended fist.

"Move quickly," ordered a blatant voice, emerging from the depths of the conical shield. "Line up against the wall, and raise your hands. You, Hal Stevens, step forward. Where is the apparatus with which you first established communication with this other intelligence across the void?"

Hope sprang anew within Hal's spinning mind. He lurched over to a wall

cowling, pushed a secret panel aside and withdrew a small octagonal case of ebonite, from which protruded several dials and a tube drawn into the shape of a helix.

"Here it is," he said.

"Keep it," commanded the other. "Go on down and out of the house. There's an ærocab on the lawn. Enter and wait for me."

Later, the tiny vehicle was rising rapidly. Hal peered down through the quartzite at the outside angles of the house, melting out of sight below. He did not know what his deliverer had done to the men in maroon uniforms. Turning slowly, he saw an elderly man sitting at the controls. At his side lay an upturned casing of metal. Hal rocked forward on his toes. He knew that face, remembered the twisted body. Deep purpose was graven in that countenance, revealing the untiring soul of a man who had long waged a bitter battle with the physical and mental universe.

"Professor Hunter!" he exclaimed. "You!"

"Yes, it is I, Hal. And just in time!" returned the other. The stooped figure seemed very tired. Eyes like livid coals turned toward the young man, burning holes through him. "Klamath is a fool. He would have killed you! Killed you because you made a mistake. It is human to err, Hal."

"You saved my life, sir," Hal ground out feelingly. "And you can understand that my first attempt to talk with the thing that is coming out of space was prompted by true scientific curiosity——"

"Call it a vulture," said the scientist gravely, "or a scavenger from some distant stellar world, out of the vast depths of space. We know it manifests life, and we know it is living in the airelessness of the vacuum of space. It's hard to think of an unbelievable creature that propels itself forward through the void by jerks of its scaly membranes, and yet there's nothing wrong with the principle.

HAL STEVENS shuddered. He remembered the moments, long ago, when the chattering static had formed the first fragments of answers from distant space. He was talking to another mind—a mind across the interplanetary gulf. That was all that mattered. There was no way of knowing what that other brain was encased in, what hideous travesty of life housed it, no knowing that it was jerking itself closer and closer to earth.

"How was I to know?" he moaned. "But perhaps Jerris Klamath is right. Perhaps he can destroy this vulture—this thing from the mysterious outer deeps of astral extension—before it reaches earth."

"Yes, but I'm afraid he can't," returned Professor Hunter vehemently. "For all his power, he is like a frightened child. His weapons are powerful but, I fear, unavailing. The rod filament is an adaptation of the destruction ray of depolarized atoms, and the substance of the vulture from outer space may differ from any thing we know."

With a mere 200-inch telescope, the invader from another galaxy would never have been sighted. But with the new Hansen light-bending field mirror, utilizing the gravity of light rays to bend them around a huge focus that extended thousands of miles out into a magnetized area of solar space, the strange lurching creature that slithered earthward in a sweeping self-made orbit was quite visible.

It was said that the thing would be over a mile high, if it ever perched on the surface of the earth with those six triangular flippers. Perhaps it would perch over some city like New York, would lean over and peruse it as a hungry hen looks down at a handful of feed vast below.

Out across the vast, unknown emptiness between galaxies the maverick had

wormed his way. A titanic realm lay behind its slithering progress, yet for Kral there could be no returning. Aimlessly, frantically, he had lurched across the endless spaces. In every direction loomed the great darknesses in weird, awesome splendor. Vast though he was, Kral knew a sickening fear, and could not cast out a feeling of desolation and solitude. Gradually the pangs of hunger had overcome all other sensations. Panic suffused Kral.

Then the emanation had drifted across the ether, across a medium which was the same as that used for communication on his mother world.

Lurching aside, his flight had developed a straight course. Instinctively he sensed life in the source of those odd bursts of static. Badly in need of food, the scavenger was pushing forward eagerly now. The pains that wrenched at its laboring vitals told it that without sustenance, other than that derived directly from the cosmic rays, the great space vulture could not survive many more flights beneath the scorching rays of many suns.

AND on the earth, unknowing of the hungry denizen from a huger world that had been attracted by his flashing beam of closed magnetism, Hal Stevens was celebrated and feted by a world that had been made aware of his communication across interplanetary space. Directional beams were sent out eagerly, were aimed; then locked; then brought to bear in the bulging bands of the light-gravity mirrors.

What a cruel shock awaited the terrestrials! There, like a nightmarish thing spawning from the Stygian darkness, slithered Kral the outcast—a great maggot of festering worlds, crawling repulsively across a bridge of nothingness by utilizing the backthrust of its jerking movements. Voracious haste marked each spurling motion.

Before it reached Pluto's orbit, Hal Stevens had received orders to stop the guiding pulsations across the beam of closed magnetism. Billions of people, as one, held their breath as the monster grew larger with each passing day in the gravity mirrors, edging nearer to the black world of Pluto.

It circled the dingy planet, extending a huge spade-shaped head from repulsive folds of neck skin. Protruding teeth ground together in anticipation, and the four green orbs became raging flames. Then it lurched on, apparently satisfied that the life it sought was not there.

Kral landed on Uranus, disappeared beneath the heaving, superheated gases of the upper envelope. Nothing on earth could have survived the poisonous fumes, yet Kral lived and emerged grotesquely from the opposite side, came on toward the inner planets.

"We can't judge such an example of outside life by what we know on earth," Professor Hunter had said. "Its composition may be of utterly different elements, or they may be the same. One thing we are fairly certain of: it is seeking something to stave off its bodily need. It has had a long flight across space. That something it needs is contemporary life. And that means us. If it ever lands on earth, it may leave a shambles."

It seemed a terrible price to pay for the folly of one man.

Mob panic seized earth. Although five years had elapsed since the world disarmament of 1990, a few ancient guns appeared miraculously, even though the explosive missiles thrown at such a colossus would be futile. It was hard to find volunteers to man the guns.

Professor Hunter had not dared to land near any of the frenzied cities, but hovered in the lower atmosphere.

"We'll wait here, Hal," said the scientist bluntly. "I haven't any great hopes for Klamath's defenses. But we can see the show here. Later, if it doesn't come over——"

"By eternal space!" spat out Hal, un-

able to picture such a catastrophic state of affairs. "What then? We can't stand to see it gobble up human beings! We must——"

"Take it easy," admonished Professor Hunter. The gray steel of his tired eyes flickered. Lines tightened along the leathery cheeks. "We won't."

"What else can we do?" exploded Hal, mashing the girdling bracework of the elastic control guard beneath writhing fingers. His cheeks became livid. "Go mad, sitting up here in comparative safety? Run away like dogs, flying across the face of the earth till it chases us down?"

"Not like that," offered the scientist with odd calm. "We'll take ours, *before* the rest of them." He looked meaningly at the octagonal outline of Hal's closed-beam apparatus, which had attracted the creature out of the depths of space.

FEAR clutched with fingers that were first as frigid as ice, then like molten lava, in Hal's pulsating bloodstreams. Professor Hunter was looking first at the mechanism, then out into the sunlight. Out there the golden solar glow lighted the roofs of small bungalows, tinted trees with autumn golds. Life was so dear, so priceless, then. But he turned his eyes at last up into the blazing sun.

"This aerocab is hermetically sealed," the other was saying steadily. "It is provided with rocket thrusts, plenty of fuel, and can cross space. Once in the solar gravity whirl we'll go faster and faster, down and down, faster and faster, and with your mechanism as a lure——"

"Prepare to release energy," Jerris Klamath ordered from the vantage point of a towering rooftop. On the mountainous slopes lying below and about the cylindrical structure, the maroon garb of his hastily mobilized army splotched the ground colors. At one end of the structure was a domed cap, from which came the hum of powerful generators.

In the glassite control cage, the Mandator seemed comparatively safe.

An argent disc hung over the earth. That was the moon. But that object, fluttering across it like an evil bat? That was—yes, it was the scavenger, at last nearing the earth.

Like a demoniacal dragon of mythology, it writhed closer and closer with each movement. The tentacular membranes whipped at space. The triangular head was turned mesmerically toward earth. The fangs hung open. The glittering green of its eyes was a reflection from the pits of torment.

Millions of earthmen watched it approach, even as Jerris Klamath watched, saw it become visible to the naked eye, viewed it at last as it entered the upper stratosphere and came on down, just as a worm pierces the skin of an apple and works its way toward the heart. They watched the purple fan of light build up to meet it from the laboratory on Red Mountain.

"Release energy!" screamed the Mandator, striving to control his voice. His pudgy fingers were knotted about the indicator knob. Sweat came in tiny rivulets down his gleaming brow. Jerris Klamath, now face to face with the horror above, had forgotten that he was the world dictator. Now he was just a quailing, insignificant man.

Vast, swelling roars of tumultuous sound were wrenched from the upper atmosphere, came thundering down the denser layers. Molecules strained and tugged at the captivity of latent energies. The very atoms were straining at their internal pressures, were colliding in a fusillading bombardment upon the mighty scales that were like plates of steel armor. A holocaust of purple flame was spewed up from giant filaments.

The alien invader had not hesitated. Slowly but surely it bored down through the heart of the purple flame.

Jerris Klamath screamed. He beat his fists into the control board, flailed his arms helplessly aloft. The Mandator had never known that fear could be so torturous, before that moment when he felt the substance of the building start to tremble and sway beneath his feet.

KRAL, the outcast, plunged down, only slightly puzzled by the purple barrier, which appeared as the thinnest of gossamer mists to his alien eyes. Transparent objects, and a creamy translucency that he was unable to understand, flashed upward. For an instant he glimpsed an incredible vista, past which his massive body plunged, ever headed toward the central core of glittering metal which alone was visible to the quadruple orbs, visible over a wave frequency more penetrating than the cosmic ray.

Scant minutes later, Professor Hunter allowed his craft to alight softly on the edge of a rift in the top of Red Mountain. Here a great depression had formed, as though of volcanic origin. The maroon phalanxes of the Mandator had broken rank and were now crowded around the brim of the huge cavity. On the edge, a segment of the former building teetered crazily, then collapsed heavily.

Hal Stevens shuddered as he peered into the depths. He rubbed his eyes, for he could see nothing of the titanic invader. At his feet, the earth was rolled back in curious little wavelets that became smaller as the distance from the edge of the depression increased. But the body of the maverick from space was not there. It had passed on, plunging through soil and solid rock, plummeting downward in endless flight.

"Who are we to guess at the infinite contrasts that exist in the universe!" exclaimed Professor Hunter. "It was of an alien life. And its body must have been of—unbelievable density."

Hal's legs weakened, threatened to give way. Around him, minions of the world Mandator were gaping like mannikins.

Slowly they awoke to a new outlook on life. Thousands of voices joined in tumultuous shouting. All down the slopes of Red Mountain, Hal could see hats sailing in the air, and maroon-clad figures jumping up and down.

"They know already that the earth is safe," spoke the scientist. "Down deep in the earth, the pressure of the upper soil strata makes the lower rock and minerals flow liquid, as fluid as water beneath tons of pressure. How were any of us to know that this alien life would prove so dense that—solid rock would be made like liquid beneath its bodily pressure! To it, the soil, the upper rock surface layers, were just like denser layers of atmosphere. It has kept going downward, and perhaps what its foreign eyes really see as the earth is but the molten core. Maybe on that lower surface, where the intense pressures exists, it will find substance to bear its weight. It might even be able to walk there. But there will be no life, and we of the upper surface world will always be as phantasmal shadows of an immaterial world to it."

DESPITE the other's assurances, Hal looked down the slopes where the rejoicing throngs were sending cheer after cheer wafting up into the skies. It was impossible that a complete understanding of what had transpired could be grasped by all those others so easily. Faintly, through the outcry of shouting voices, he heard words. They understood merely that the vulture of space had destroyed the man whose ruthless greed had caused him to dominate all terrestrials for a few short days of indescribable horror. His passing appeared now as a sign from the gods. The Mandator was dead.

The Time Contractor

by Eando Binder

THE contraction of time would release energy!"

This statement, delivered in measured tones by "Doc" Rowe, marked the beginning of his attempt to win the Nobel Energy Prize. In 1938 the Nobel prize committee issued the bulletin that startled the world. It read:

> The Nobel Prize Institute, founded in 1901 for the advancement of science and betterment of mankind, hereby announces a new prize, separate and apart from its usual list. This prize, to the amount of one million dollars, will be awarded to the first person to discover a source of energy different from any in use to-day.

Mankind's main source of power to-day



is from coal. The day will come when there is no more coal. Oil, wood, vegetable fuels, can never supply man fully. Nor can electrical energy from chemical interaction, except at prohibitive expense. Wind power and water power, although coming more and more into use, are likewise not the answer to the problem.

Some inexhaustible source of energy must be found that will last through the ages. It must be cheap to produce; it must run on something that will last as long or longer, than mankind.

The prize of one million dollars is being offered as a stimulus to efforts in that direction, that have gone on perhaps half-heartedly. Any person, or group of persons, of any race, color or creed, may compete for this prize.

There are no rules or restrictions. The results will speak for themselves. The only stipulation is that the discovery that wins the prize must be turned over to the committee, for release to the world on a no-profit basis.

This prize is being offered indefinitely, for the next hundred years if need be.

That was the message that was sent to every government of earth in 1938. It was printed and reprinted and broadcast and talked about till it is doubtful very many persons in the world had not heard about it.

The seed bore no direct fruit for ten years. Many brilliant minds wrestled valiantly with the problem, only to retire to less spectacular, but more productive pursuits in the field of science. Thousands of plans were submitted to the committee in the first few years. Most of them were rejected at a glance—brain storms rather than brain children. Some few showed promise, but proved abortive.

AT ANY RATE, Doc Rowe finally announced his intention of making a try for it, with those enigmatical words: "The contraction of time would release energy!"

"Huh?"

We said it together, Alvira and I, and looked up from our work, startled. We were his assistants at that time, and afraid of him for his quick temper. Yet we liked him for the kindliness beneath his bristly, volatile temperament.

Doc Rowe repeated his statement and searched our faces for signs of comprehension. There were none, I'm sure. His bushy black brows drew together to a perfect V. Alvira and I winced before he even spoke.

"Fools!" he barked. "Time is a function of motion, isn't it? The relativity formula shows that with increasing velocity, the time factor expands, enlarges, becomes boundless. A second becomes a century. Energy is also a function of motion, you'll agree. Thus, increasing velocity means increasing energy and expanding time. So, my little nitwits, *contracting* time means decreasing energy. To state it objectively, when you contract time, you decrease the energy factor. But energy is never destroyed, is it, Alvira?"

"N-no, sir."

"Therefore——" he probed.

I saw that Alvira was stuck. She had always been a little more awed by him than I, and could not keep her wits with his fierce little eyes upon her.

I spoke up for her: "Therefore, when we contract time, we *release* energy."

"Ah, good boy," grunted Doc Rowe, shifting his gimlet eyes to me. "But tell me, Bob, isn't that a ridiculous thought? To take time, something intangible, invisible, incomprehensible, and contract it—squeeze it together like a sponge?"

"From a purely mathematical standpoint," I answered, not knowing around which side of me he was getting, "it is not at all ridiculous. In any formula, any single factor may be taken and altered, thus altering the other factors."

"Tail swinging the dog," mused Doc Rowe. He was still frowning. "Now, Bob, how can we actually contract time?"

It was several seconds before I ventured an answer. "Perhaps some force field, some electromagnetic projection

into the fourth dimensional space-time continuum would——"

"Bah!"

He glared at me and wilted. "What are you?" he went on scathingly. "A man of science or a yogi? How can we contract time?"

"Sir, I—I——"

"We can't!" roared Doc Rowe. "Do you hear—we can't! If things were that easy, science would be a game. But if we can't take time and contract it to get our energy out of the time-mass-energy system, we can at least decrease velocity. That, my babes, is our focal point of attack. I am going to give the Nobel committee a new source of energy—from the contraction of time. But not for the million dollars. Oh, no. That is an insult to science, a slap in the face to research! I'll give them their new energy. Then I'll take the million and throw it back in their faces!"

He glanced at his watch. "Now get out, you two. Be here promptly tomorrow."

We thankfully tossed off our lab coats and made for the door.

On the way to the bus, Alvira said, "Thanks for pinch-hitting for me, Bob, when I was stuck." She said this a bit stiffly. I had only known her three months, since she had won her way into Doc Rowe's laboratory. In that time she had displayed amazing brilliance. Even to old Doc, who was skeptical of feminine intellect. To-day was the first time she had been completely at a loss.

"Glad to help out," I said. I'm afraid I said it patronizingly.

"Oh, I would have had the answer in another second," she fired back, "if the old bear hadn't been so impatient. You don't think——"

I laughed, and that was a mistake. She froze up and I walked along with an iceberg. The bus whirled up and she got on. I watched her a bit glumly. At the last she looked out of the window at me —and gave me a disarming smile. Talk about your million-dollar prize!

DOC ROWE was in a sly mood the next day. "Have you found a way to contract time?" he greeted us—or me. "Too bad time isn't like a rubber band, that one could stretch and then release to normal."

I put on my lab coat thoughtfully. "Look here, Doc"—you could call him "Doc" when he was in a good humor—"there's a fundamental fallacy in your theory of reducing time and gaining released energy. When you reduce time, you automatically reduce velocity, and that *uses* energy. Newton's first law—bodies at rest or in motion require energy to accelerate or decelerate them."

"Isn't he the bright one, though?" chortled Doc Rowe, smirking at Alvira. "Found the hole that will cost a million dollars."

He turned away to shuffle with a bundle of spectrograph charts, as though having dismissed the idea entirely. But I knew that sly twinkle was still in his eye. Over his shoulder, he said casually, "By the way, Bob, here's something to tickle the brain. What is perfect inertia? When you have the answer, come to me."

Perfect inertia! What did he mean? Inertia was a state—the state of bodies either in motion or at rest. Inertia was the antithesis of motion change. Inertia was fundamental. How could there be different inertias, and one more perfect than the rest? It was a direct challenge.

Every now and then Doc Rowe would give me a sidelong glance of suppressed amusement. He would keep that up all day unless I came up with something logical. Alvira had been thinking, too. Under cover of rustling paper, she said, "Inertia is always relative—in any equation! Perfect inertia would be absolute inertia, which doesn't exist any more than absolute space!"

FIVE MINUTES LATER I had convinced myself of that, too. I almost ran to Doc Rowe at his desk in the far corner. He twisted around with a grinning leer. "Have you discovered perfect inertia?"

"Yes. That is, it's——"

"Wait, wait!" broke in Doc Rowe. "Don't tangle yourself up in a long-winded tirade. Let me ask you some questions. When you increase the speed of an object, you use energy. When you decrease the speed, energy is again expended. Why?"

"Because inertia is relative."

He nodded and went on: "When a planet warps space, it exerts a power of attraction, so called, which is energy. To unwarp space, what would you do?"

"Destroy the planet, which again uses energy. Inertia—the state of being always the same—is relative there, too."

"Good lad," beamed Doc Rowe. "Thus?"

"Thus, to generalize, any system of balanced energies is in a state of inertia. To go in either direction one must use energy. When the new balance is reached, we again have inertia, at a lower or higher state. Inertia, then, is purely relative."

"Think of that!" sang Doc Rowe. "One more question: What is absolute space?"

"A myth. It is supposedly that which carries a light beam at its standard velocity. Yet because the appreciable speed of our earth fails to affect in the slightest the speed of light—the Michelson-Morley ether-drift experiment is the authority—there can be no absolute space that you can pin down as such. Space is relative to the point of observance."

Doc Rowe's bright little eyes gleamed with tiny devils. Any moment the ax would fall. First he called Alvira over—to watch the execution. Then he ran a fine hand through his shock of gray hair. Finally, he pounced on the mouse—me.

"Space is relative, you say, Bob. It is not fixed. It goes along with the observer. And it goes along with two different observers at two different speeds, so that a ray of light passing from one to the other has the same velocity to each! Now note. Space is relative to the point of observance, but it happens to be relative to two separate observers, and to both the light speed is the same! Therefore, *space itself*, relative to itself, is absolute! A light ray measured by that standard must have different speeds to different observers. Yet it hasn't, because the time intervals balance the equation by also changing."

I felt the cold blade on my neck.

"Now," he went on, "you just stated that any system of balanced energies is in a state of inertia. You can go either way, by using energy. Like a reversible reaction in chemistry. But suppose one reaches the state of inertia in absolute space! What have we then? Eh?"

Alvira and I glanced at one another helplessly. Doc Rowe was asking us to picture a space relative to any observer, yet absolute to itself. Moving in all its parts, yet rigidly fixed. And in this paradoxical system, we were to find the nugget of absolute rest—perfect inertia!

"I ask you to picture a house," Doc said wearily, "and you think of a boat. Man attempts to measure the infinite with the foot rule of his mind, and imparts its own whirling motion to it. Listen carefully, my changelings. Two bodies revolve about one another in space. If their periods of revolution are equal to their periods of rotation, they are relatively motionless. To outside observation they are moving, circling. To themselves, they are not. Likewise can space be moving to any observer, yet be motionless—absolute—to itself!"

That thought struck oil. It hit me, and something of dawning comprehen-

sion must have peeped out of my face. "Doc!" I cried. "Could there be a space time without—*time?*"

"Splendid!" said Doc Rowe. "Amazing! That was a bull's-eye. But let's see if you realize fully the consequences of that blasphemous conception. Space time without time is what?"

"Absolute space," I said readily.

"Why?"

I hesitated just a bit. "Because velocity is a function of time, and without time there is no velocity—no motion. That is, we say it takes ten minutes for a body to move from here to there. If the ten minutes is made a zero factor, the body has not moved at all. Therefore, if time, and with it velocity, cancel out, the space containing the body is absolute—contains no motion."

It was a weak sort of rhetoric, but Doc Rowe let it pass. "And the other factors in the equation—energy, mass?" he whispered.

I had not thought of that. It took a full minute to explore this angle. Then I spluttered, "Why, energy would be zero. Mass would be zero. Everything would cancel out! You would have just—space!"

"Ah-a-a!" It was a triumphant ululation from Doc Rowe. "Think of it, Bob and Alvira. In the beginning there was just space—the void, eternal, timeless. Then something—call it the Hand of Creation—put in its finger, stirred it violently. A universe sprang into being! Motion gave rise to time; time gave birth to energy; energy sired mass. Or, if you wish, the Hand of Creation dangled a clock into absolute space. Time instantly fathered motion, motion mass, mass energy. The result was the universe!"

WE WENT BACK to our work, all three of us, as though exhausted by our mental flight into infinity. Our tabulation of the spectrograms seemed trivial. It was not till an hour later that I thought to ask, "But, Doc, what has that to do with winning the Nobel energy prize?"

"Eh?" He came out of a profound study. "I shall throw the million right back in their faces!" he said irrelevantly. And that was all he was good for that day.

"What say," I asked Alvira, on the way to the bus, "that we take observations this evening?"

"Observations!"

"Yes, of the moon! Out in the laboratory of the open sky."

"Well, in the cause of science, all right!"

Later in the evening she said, "Just think, if the Hand of Creation hadn't stirred things up there in the beginning, the moon wouldn't be there!"

She laughed. "There wouldn't be any universe, any earth, any Rushmore College, any Doc Rowe, any anything. There wouldn't even be us!"

"I question that," I returned. "You were especially created, apart from the mediocre universe."

"That isn't very scientific." She smiled.

"No, but it's poetic."

"And I hate poetry!"

And so, all through the evening, my equations canceled out to zero—absolute zero. Like Doc Rowe's absolute space without motion, it was an absolute zero without emotion.

AT THE END of the week we had our spectrograms completely tabulated. Doc Rowe was in a particularly stormy mood.

"We are now going to start our search for energy for the Nobel committee—and for that million I'm going to throw into their faces," he said. "Where, Alvira, did I say was going to be our point of attack?"

"Velocity, sir."

"And what is velocity?"

"A function of time."

"Why must we start with velocity?"

"Because velocity is something tangible, which we can alter; whereas time is abstract."

I was holding my breath at this machine-gun attack by Doc Rowe. He went right on, voice staccato: "How is it that time, which is abstract, can have as a function a tangible factor such as velocity?"

Alvira went a little pale. "Time is—is beyond our physical scope," she floundered. "Beyond our—our senses—our percep——"

"Bah!"

Doc Rowe pinned her with a fierce glance. I could see her thought fall into a whirlpool and scatter to the winds. She turned to me appealingly. My expression must have been one of secret amusement at this proud, intelligent girl who spurned my attentions, but begged my help when foundering before Doc Rowe's corrosive attacks.

As she sensed my triumph, her expression changed. Something stiffened her spine with an almost audible snap, and she whirled on Doc Rowe. "Time," she spat out, "is a condition of relative space. In that sense, it is a fourth dimension, beyond our three-dimensional grasp. Velocity, on the other hand, is the functional extension of time into the physical world of three dimensions, and is thereby available to our manipulations."

"Very well," Doc growled. "Now, Bob, what is it we wish to do with velocity?"

"Reduce it to zero in absolute space, with release of all positive energy."

"How much energy will it take to produce this absolute motionlessness?"

"Frankly, sir," I stated with conviction, "that is a fundamental obstacle in this project. Energy used will equal energy gained. Relative inertia——"

Doc Rowe's arms flung out; his head jerked; his mane of hair flew upward, as if he were exploding—and he was.

"Relative inertia be twice damned!" he screamed. "Imbecile! Did I talk to the wall yesterday? *Absolute* inertia! Have you forgotten? Everything in the universe is in motion in absolute space. Everything—save for one thing. That one thing is in, or can achieve, the state of absolute motionlessness—absolute inertia!"

His blazing little eyes searched our faces, then became a little mad at what must have been absoluteness of another kind—absolute incomprehension.

"You do not understand!" he groaned. "You cannot even guess! I will give you one more chance. Look, my little white elephants, I am simply asking what conceivable thing will have this perfect inertia. What substance, when formed, will immediately fix itself in inertialess space, because there is no known power capable of giving it momentum. I have all but named it!"

I felt Alvira stir at my side. Both of us cried the word at the same time and looked at each other startled.

"Inertron, of course!" barked Doc Rowe. "Inerton, the cores of atoms packed together like sardines, is the substance that will automatically reduce its velocity to zero in absolute space. Its zero velocity, with respect to space *time*, eliminates time in the equations. Thus time is contracted to nothingness, and every bit of the positive, not relative, momentum it had at the time of formation is released. It is that energy of momentum which we will collect as pure gain."

WHILE he had been talking, he had uncovered an apparatus on his private workbench. I'd seen it before, but had never taken particular notice of it. It looked vaguely like an acetylene torch inclosed in a Crookes tube, which was supported in a rigid framework of steel. The two nozzles bristled with tiny electrodes from which insulated wires

trailed to the back of the tear-shaped tube. Several inch-thick cables led externally from the tube to the wall panel and were plugged in to the source of seven million electron volts with which the laboratory was supplied through a duplicate of Lawrence's *cyclotron,* which first made neutrons in large quantities.

"Now," said Doc Rowe, patting the tube affectionately. "We will go from the theoretical, and somewhat figurative, to the experimental. I built this tube originally, years ago, to produce artificial radioactive elements. But now I have a new use for this micro-particle projector. Bob, how many subatomic particles are there known to present-day science? Name them."

I went down the list. "In the low-mass group, electron, positron. In the heavy-mass group, alpha particle, proton, neutron, and deuteron."

"And——"

From my blank puzzlement he turned to Alvira and barked a querulous "And ——" Then, finding us both lacking any sort of answer, he stepped back from us as though we were lepers.

"Words fail me." He sighed. He went on in a disillusioned monotone: "I am positively afraid to ask you what two plus two is. I'm going out now, for an hour." With which he left, shaking his old head.

I looked in Alvira's eyes and saw a reflection of my own flattened ego. Then, quite suddenly, we were laughing.

"Imagine," she gasped, "words failed him! He needs a new set of synonyms for 'imbecile.'"

The laugh did us good. Alvira wagged a mock finger of scorn under my nose. "That time we *both* got mowed down by Doc's bombardment."

Somehow, that had forged a common bond between us. "Alvira," I said suddenly, taking a step toward her. She did not back away.

WHEN Doc Rowe returned, he was deep in venomous moodiness, but Alvira and I didn't particularly care. "So," he growled, "I give you time to atone for your abysmal ignorance of before, and I come back to find you in each other's arms. Is this a laboratory or a lover's nook?"

"We're getting married," I announced, with the feeling of throwing a bomb.

I warrant Doc Rowe has seldom been that startled. Words failed him again, apparently. We smiled as the old codger assimilated this unclassifiable fact in his scientific brain. He managed to recover after a moment.

"The principle of indeterminacy is not infallible," he murmured. "Not in ***that.***" He waved a hand to include us and the intangible principle for which we stood. "I suppose you'll be leaving me?" he said in a voice of defeat.

"Oh, no," I assured him. "It won't be as sudden as all that. We'll finish out this term with you."

He nodded. "Naturally," he acceded, "I couldn't expect you at this time to be concerned about such an irrelevant thing as a subatomic particle, in the face of this sublime biological discovery you've just made. You may as well leave for the afternoon."

"That's just it, Doc." I grinned. "The one we failed to name before is the triteron, the isotope of hydrogen having three times the mass of the hydrogen proton. It is the prototype of the deuteron, and completes the scale from Atomic Mass 1, which is ordinary hydrogen, to Atomic Mass 4, which is the alpha particle of helium."

Dos Rowe, incapable of being further surprised that day, beamed on us. "Splendid!" he crowed. "To-morrow, then, we will see what we can do with the triteron in our attempt to contract time, achieve absolute inertia and gain free energy."

He shooed us out, though it was an

hour before our usual quitting time, proving he was more human than he ordinarily cared to admit. Alvira and I were, of course, only too pleased. We had dinner together, happy as larks.

NEXT DAY, true to his promise, Doc Rowe launched the project. He herded us before the machine which used submicroscopic artillery. Without preamble, he threw the switch that rammed seven million electron volts into the tube. It flared up with the violet light of ionization, and hummed busily.

Doc Rowe pointed to one of the barrage of meters he had hooked into the chamber of action. Periodically, about once every ten seconds, its needle leaped spasmodically over the calibrations on the dial. Then he shut off the apparatus.

"Now, my little love birds," he began, "suppose we figure out what we have so far. From the left nozzle is projected a stream of neutrons formed by bombardment of carbon by alpha particles from radium, as first performed by Chadwick in 1932. From the right nozzle we get triterons. The seven million electron volts from the cyclotron are converted into an alpha ray, which bombards lithium and gives a high percentage of triterons, as performed by Lawrence recently. So far we are doing the usual."

He then pointed to the sphere of action in the tube. "However, you will note that the nozzles are directed inward, so that their beams cross in the center of the tube. Whenever a triteron collides with a neutron at this focal point, there is a significant result. As the meter showed, a great deal of energy for such small masses is released. Now, Bob, what exactly is formed, do you suppose, when a triteron collides with a neutron?"

"An atom of inertron," I retorted promptly.

He gave me a puzzled nod and swung on Alvira. "Just what is an atom of inertron, in subatomic terms?"

"It is composed of one alpha unit and one proton—or five protonic units—joined together with the usual planetary distance reduced to a practical zero."

"What is its atomic weight?" This to me, dazedly.

I could not help grinning and rubbing it in. "It is not *five,* which is the sum of an alpha particle and a proton. It is in the order of a million million. Thus a cubic centimeter of inertron would weigh a million million grams."

Doc Rowe decided to get mean then. "How do you account for a neutron fusing with a triteron in this new fashion to give an atom of inertron?"

"A neutron," I said, "has no charge. Therefore, it pursues a straight line past the outer shell of electrons of a triteron. It is thus able to collide directly with the nucleus. This collision, like no other nuclear collision, causes complete collapse of the newly formed nucleus." I frowned. "I don't know the reason for that."

"Imbecile!" he said, but with a pleased grin that I was stuck at last. "A neutron must *always* cause collapse of a nucleus, because it is the only high-speed, heavy-mass atomic projectile which is capable of penetrating within the atom without loss of speed. That, of course, is because of its neutrality. A proton, or even the massive alpha particle, always retards velocity in the field of force of the electronic shell, before striking the nucleus. They are too weak to do more than give the nucleus a hearty shove when they arrive. But the neutron, arriving with all the fury of its projection, smashes into the nucleus with stupendous force. With enough force, in fact, to carry out a real fusion, similar to two drops of liquid joining. It plunges into a nucleus like a planet plunging into earth, to completely melt the two together. Do you agree?"

He glared at us belligerently. I'm certain we had no outstanding objections and Doc Rowe went on like a juggernaut: "And when we get an atom of inertron, Alvira, what is the result? No —I'll answer myself, since we must not waste any more time. The atom of inerton formed, the heaviest possible in the entire cosmos, promptly ceases all relative motion, simply because there is no known force in the universe capable of giving it momentum. It does not obey Newton's first law of motion, because that applies to relative space, and inertron exists in the absolute. It possesses absolute inertia in absolute space. At the moment of formation, therefore, an atom of inertron releases all positive, kinetic energy it had from its former constituents. This remains behind in our apparatus, in the form of by-product radiations, which we can easily gather in."

His hands made the motions of gathering in large piles of invisible treasure.

"What does the inertron atom itself do? It leaves the apparatus, leaves earth, and plunges with inconceivable velocity for the core of the universe, the hub around which all galaxies, including our own, rotate. This is estimated to be about a million light years in the direction of Sagittarius. Nothing can stop it. It plunges through suns, planets, and all matter without the slightest hindrance, for it is almost infinitely small and infinitely heavy.

"At the hub of the universe it comes to rest, joining itself to the mass of inertron which must exist there. Here it stays for all time, immovably. None of the laws of the universe we deal with applies to it. Time, for it, has been contracted to nothingness, to an absolute zero as absolute as its inertia, and as the space it exists in, and as the mass it contains. To us, it does not exist at all, for you remember our equations cancel it to a zero when time cancels to zero. Yet it exists, also, in the absolute space that does not exist for us. It is a paradox almost without meaning."

He sighed and brought himself down to earth, as though he had been out there at the mysterious hub of the cosmos.

"However, that is the basis of my inertron generator—and of my original contention that the contraction of time releases energy.

"But there is work to do. We must find a way to increase the percentage of collisions of our neutrons and triterons. At present the apparatus uses more power in projecting these particles than it gains in the formation of inertron atoms."

WE PLUNGED into concentrative work. I will not go into detail, but three months later we had a magnetic-field surrounding tube that drew the stream of triterons into a tight beam which could be focused on the stream of neutrons almost like the two jets of a hydro-oxy torch are aligned. And like that instrument, at the point of convergence a powerful holocaust took place, but thousands of times more energetic.

The millions of inertron atoms we formed, going through the glass, steel, our bodies perhaps, and earth, and out into the absolute, left behind their legacy of power, far more than we put into the machine. It was almost miraculous.

Doc Rowe, just before Alvira and I graduated out of his hands, drew up a complete set of plans and mailed them to the Nobel energy prize committee. "Mind you," he explained to us elaborately, "I do not care a fig for the fame this will bring, nor the prestige to Rushmore College, and least of all for the million dollars. I could have announced the neutron two years before Chadwick, and radio sodium before Lawrence, but does it matter who carries the banners of marching science? I seek truth for itself. The million dollars? Bah! You shall see me fling it back in their faces!"

I was never able to figure out just to what extent Doc Rowe meant those things. I cannot say whether his Cavendish nature was assumed or real. But I'll never forget the day he tore open the letter from the Nobel committee in our presence, read it, and turned a sickly green. We read it, Alvira and I.

Briefly, it explained that an apparatus quite similar in design and operation had been described to them *a week before!* It had been submitted by none other than Dr. E. O. Lawrence, of the University of California. And that, therefore, with regrets, the prize would go to him.

We were sure, Alvira and I, that the sole disappointment to Doc Rowe was the lost chance to fling that million-dollar prize back in their faces! But it was ironical, we thought, that the man who could contract time hadn't contracted time in time!

That marked the end of the Nobel institute's singular experiment to take care of civilization's power needs for all time. The Nobel committee's commentary was: "There is no doubt that the result, in one bold stroke, has tied man to the infinite. The inertron generator does not depend for its fuel on such transient things as coal or water power. Its power is from the subatom, which makes up *all* matter. This energy source is eternal so long as matter itself, and the life it composes, is everlasting. Its principles will operate a million years from now, and a million million, long after the siftings of coal in earth's crust are exhausted. Civilization has carried a back-breaking load of this black gold since the inception of the steam engine in the middle 18th century. To-day we break free. Civilization rides the atom!"

But all stories seem to have unexpected anticlimaxes. At least this one does. Alvira and I were agreeably surprised, a few weeks later, to read in the papers that the Nobel committee had split the million-dollar melon between Lawrence and Doc Rowe, since they had independently devised the same machine, and almost at the same time.

"I wonder," said Alvira, "if Doc Rowe will throw that *half* million back into their faces? Or has he had his heart set on doing it with the full million!"

A few days later, as though in answer, we received a note from Doc Rowe, saying:

> It was Lawrence himself who insisted on the division of the prize. Under those circumstances I could not fling it back in their faces, could I? Herewith is a little memento of our labors together—for the advancement of biology.

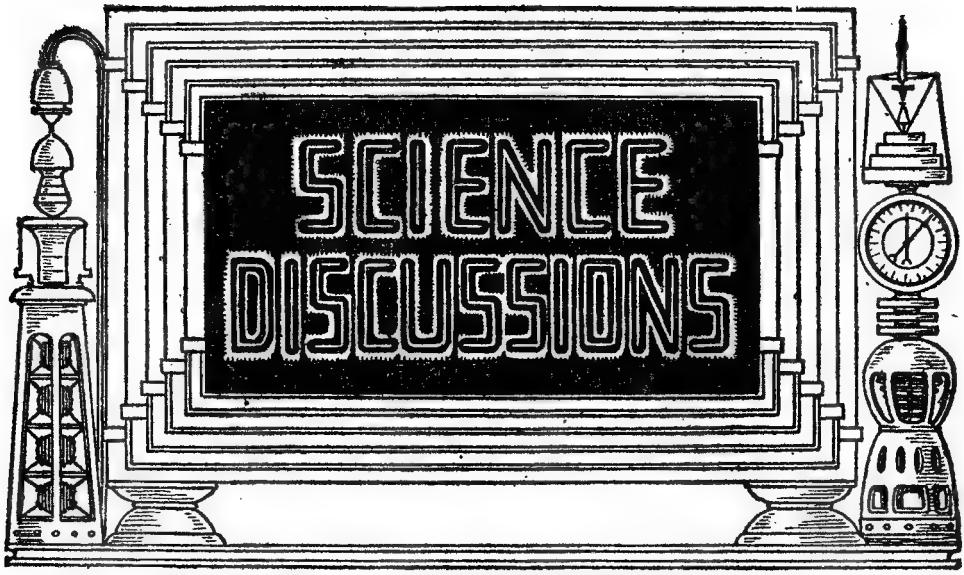
It was a check for fifty thousand dollars. You figure the man out!

Power Plants Of To-morrow

by

WILLEY LEY

In The January ASTOUNDING STORIES



AN OPEN FORUM OF CONTROVERSIAL OPINION

The Last Word?

Dear Editor:

Some of the readers may have been puzzled by the next to the last paragraph in the September issue; that was the compositor's fault, not mine. What I said was that the English noun "squash" was from the Algonquin *askutasquash*, whereas the verb "squash" was from the vulgar Latin *exquassare*. For more dope on linguistic change, see Kenyon, "American Pronunciation."

Also, for phlogiston theory read caloric theory (my fault this time). For classic examples of murder of a beautiful theory by a gang of brutal facts, see Jastrow, "The Story of Human Error" and "Wish and Wisdom."

An English mathematician had, I believe, the last word to say about the why not? argument. Those of you who are familiar with the classics may recall the following dialogue from his works:

"'They were learning to draw,' the Dormouse went on, yawning and rubbing its eyes, for it was getting very sleepy; 'and they drew all manner of things—everything that begins with an M——'

"'Why with an M?' asked Alice.

"'Why not?' said the March Hare.

"Alice was silent."

For positive evidence that the American cultures were indigenous and not exotic, consider this: In 1492 the peoples of the New and Old Worlds had just one domestic animal—the dog—in common, and not one single domestic plant. And it isn't as though maize, potatoes, pumpkins, lima beans, etc., won't grow in the Eastern Hemisphere, they do, on the slightest provocation; and conversely with domestic plants imported into the Americas from Europe and Asia. What sort of agriculture could Mu-Atlantis have had for its plants to have been so peculiarly divided up? Answer: none.

The fourth dimension seems to have been bothering some of the boys again. Properly speaking, this is a mathematical term and, mathematically, a dimension is any quality of a thing that you can measure, such as length, width, age, color, pie-eating ability, etc. (See any large dictionary.) It's not a mysterious whatnot that you could "see into" if you had a pineal eye, or that you could ooze into and out of like Popeye's Jeep. Not only has a thing as many dimensions as it has measurable qualities, but there's no rule against taking them in any order you please.

Hence to say that "time is *the* fourth dimension" is to make a meaningless noise, in Bertrand Russell's phrase. If your problem is how long it would take you to walk to the post office, you have three dimensions to consider: time, speed and distance to the post office. If you want to make time your first dimension for the purposes of the problem, well and good. Time is the first dimension. If you want to make it the third, O. K. But, of course, you have to keep your dimensions in the order you started with throughout the problem. It really is as simple as that. (See Bell, "The Search for Truth," again.)

I fear that Mr. Turner will have some difficulty getting an explanation of his vanishing hydrometer that doesn't involve the bending of light rays; that *is* the explanation, you know.

For a really lucid account of this and similar phenomena, I suggest Lemon, "From Galileo to Cosmic Rays."—L. Sprague de Camp, 810 Green Ridge St., Scranton, Pennsylvania.

More Information Wanted.

Dear Sir:

I have been swamped with answers to my question, published in the September issue. None, however, seem to be satisfactory.

The question, you may recall, was: "Why did a hydrometer become seemingly invisible when placed in a flask of alcohol?"

Some of the answers were as follows:

Lawrence Rey, Chicago: "The light was refracted at such an angle as to strike the eye and to blot out the original image."

R. T. M., Boston: "I tried your experiment myself and it did not completely work, since only the mercury in the hydrometer seemed 'invisible.'"

Mal Knebel, N. Y. C.: "Something you ate!" I wish to thank all of the above for their interest, but I'm still waiting for a *simple*, clear explanation.—Gerry Turner, The Alden, 225 Central Park West, New York, N. Y.

Thermodynamics in Interplanetary Travel.

Dear Sir:

Having just read Part I of Dr. Smith's "Galactic Patrol," I would like to offer a few comments, particularly concerning one long-neglected subject, thermodynamics in interplanetary travel.

Up to the present, the common belief has been that space travel in the universe depends on the much overrated "dynamic clairvoyance," as it has been called, instilled by widespread misinterpretation of the correct facts—often due to the science-fiction authors themselves. The popular conception of gravitational nullifiers and machines for travel in other dimensions has always been the basic foundation for this extensive misconception.

A new light should be received by novitiates of the new order of interplanetary transference. Thus we consider it an ideal state when gravitational effects are reduced to a minimum, thereby annulling the usual misconception hitherto maintained by supporters of the Von Hochberg theory—the most convenient conception to-day. A conservative outlook is always to be desired; at any rate it is best to consider the future of manipulatory interplanetary exchange and to overlook a past of fallacious ratiocination which has never pleased me.

I shall welcome letters from any one who wishes to continue discussion with me along these lines.—L. S. Bergh, 3418 Jerome Ave., Bronx, New York.

Any Cavers, Potholers, Speleologists?

Dear Sir:

If any of your readers in limestone areas consider themselves "cavers," "potholers" or even "speleologists"—at any rate, who have a predilection for crawling about in the muddy bowels of the earth—and would care to write to me, it may be possible to fix up an exchange of notes, photographs, etc.—A. McMillan, 30 Berkeley Square, Clifton, Bristol 8, England.

Celestial Mechanics Continued.

Dear Editor:

I seem to be starting to write more or less regularly. Well, that's hardly an evil, I guess, with something in every Science Discussions column to interest me. I especially want to continue this discussion of celestial mechanics which R. S. Vickers started in the present issue. It is a question which I have often intended to bring up myself (glory-snatcher).

It is possible that friction would slow up the planets eventually to a point where they would fall into the sun—if we count the immeasurably small but nevertheless accumulative effect of the so-called "cosmic dust," which filters throughout space at a density of one atom per cubic inch. Obviously, such a process would take a long time, and any other force working no matter how slowly (up to a certain point) in the opposite direction would be bound to conquer.

It would seem to me that we have such a force. We can see it in our own satellary system. Once the moon was but 8,000 miles away from the earth and the day and the month both equalled four hours. Now, from the braking action of tidal friction, which expends energy at the rate of 2,100 h.p. continuously, the day is twenty-four hours long. The result of this is that the moon has backed away to 250,000 miles. It is still backing, measurably so, six tenths of an inch per year.

This retardation is due to the laws of conservation, or rather I should say the retardation of the moon is due to them. The tidal friction slows the earth's rotation and angular momentum. This energy must reappear somewhere, and we discover it in the moon's orbital angular momentum, producing an increase in the speed of the body and a consequent increase in distance. (This is in the lunar tides, naturally.) This effect must necessary hold true with respect to the solar tides, increasing the earth's speed, thus moving it out from the sun. And so with the other planets.

I hope this will do at least something toward keeping the earth out of the sun in future stories.—Jim Blish, 91 Halsted St., Orange, New Jersey.

In Answer to Mr. Croutch.

Dear Mr. Tremaine:

This is in reply to Mr. Croutch's friendly remarks concerning my disbelief in lost continents. I have not, as Mr. Croutch suggested, started with a disbelief in them and then sought evidence to prove my contention. On the contrary, I once did believe in them. But after examining the evidence pro and con, I found (a) that quite a bit of the so-called evidence for the lost continent theory was untenable, and (b) that there are a great many very good arguments against such a theory.

The existence of pyramids in both Egypt and tropical America has often been cited as evidence of some sort of relationship between them. If so, how do you account for the use of pyramids by the Tongafiti group of Polynesians? Don't tell me that they are the descendants of the people of Mu, because there is an overwhelming amount of evidence to show that they came from somewhere west of the Malay States, probably India, approximately 2000, not more than 3000 years ago. For this I refer you to the works of Fornander, Churchill (not Churchward), Smith, Stimson, and others. Also, how about the pyramidal (Hindu) temples of Bali, Java, and even India itself? The answer is simple. A pyramid is the simplest, strongest, and most enduring type of building that can be made. It is also pleasing to the eye.

The question of sun gods is equally explainable. Why shouldn't man worship the sun without being taught to by somebody else? Any one can see that the sun is what makes his crops grow. While it shines, his enemies and evil spirits can't sneak up on him without being seen. Without the sun he can't hunt for game animals, but the carnivores can, and do, hunt him. Later on he realizes that the sun apparently controls the reproductive forces of nature. All primitive, some civilized people, stand in awe of that; some worship it.

It is quite true that every one makes mistakes. I haven't the slightest objection to believing in lost continents, providing some one can offer better proof than they have so far, and can logically explain away my objections. Even the latter condition alone might be sufficient.

For example, if there was a continent in the Atlantic, what do you suppose happened to all the water it displaced? There is no evidence, as any geologist will tell you, that any coast line was significantly different 12,000 years ago than it is to-day. If there were differences, they were lower because of the water locked up in the glaciers. The same applies to the Pacific, only more so, because the water is much deeper there. Also, what caused the continent to sink, and what keeps it down now? Continents are composed of light acid rocks that literally float on heavy basic basalts, etc. Ocean beds are composed of these same heavy rocks. I shudder to think of the catastrophic happenings that would ensue to the whole world if Australia occupied even so much as a week in sinking, let

alone 48 hours. If life survived at all, it would be a miracle surpassing even the sinking of the continent.

I quite agree that parts of the United States, for example, were once under water, but that was several times 12,000 years ago, and the water was very shallow at that.

I can match your theory of the flying, fire-breathing dragon without presupposing a human agency. Did you ever see a slow fireball (meteor)? If not, I'm not surprised. They are quite uncommon. I've been lucky; I've seen two. Both of them sailed, almost lazily, through the sky trailing red sparks in their wake. They might lead to a belief in dragons, just as a steam-driven airplane might. However, mythological studies indicate that the dragon originated as a wingless sea monster.

As for Cyclops, he really existed! If you will look through some of the earlier issues of the "American Anthropologist," new series, you will find a photograph of him, or maybe it was her. He, or she, was a human monster that, through some mischance, had one eye over his nose. Such monsters have occurred more than once (see Monster, "Encyclopædia Britannica"). There is also a picture of a mermaid or merman. In this case the child's legs were fused together. I can think of a lot of deities that might have originated in similar ways.

Speaking of deities, if Zeus was a king of Atlantis, how do you account for the existence of the same god name in Sanskrit? Zeus' full name was Zeus-pater; in Sanskrit he was Dyauspiter (sky father). His other Latin name, Jove, genative Jovis, comes from Diovis-pater. In Teutonic languages we find Ziu, Tiu and Tyr. I fear that a god that was known even before the separation of the Teutonic people from the parent stock could never have been king of Atlantis, even if there was an Atlantis. The same can be done for a number of the ancient gods and goddesses.

These do not exhaust my objections by any means; these are simply the first ones I thought of.—John Buddhue, 99 South Raymond Ave., Pasadena, California.

More About the Tesseract.

Dear Mr. Tremaine:

Frank Bochik, Jr., of Indiana Harbor, with his drawing of a tesseract and his discussion of a fourth dimension, opens a topic worthy of discussion; but one, I fear, to briefly be disposed of.

The tesseract is an interesting figure, with a square plane leading from each of its points, like, yet unlike, a cube. It is, however, like a cube in one prominent respect—it can be supplied with only 3 imaginary axes, each of which lies at right angles to the other two, none of said axes being parallel to any other. Thus, like a cube or any other solid mass, it has only 3 dimensions, or cross measures.

I am, it seems, as narrow-minded as the Donald to whom Frank refers. I cannot think that there exists any demonstrable fact that I am too dumb to comprehend, given that its subtleties are explained to me if I cannot detect them myself. I am, in truth, more narrow-minded than Donald and the very person at whom Frank would most delight to hoot, for I aver that mathematics measures matter and that abstract mathematics—applicable to spaces in which little or no relevant matter exists—is still abstracted from what is true concerning matter.

So, if it is true of a cube that it can be crossed by no more than 3 lines lying at right angles to one another, it is equally true of imaginary spaces that only 3 imaginary lines can cross at a common center with rectangular incidences. To raise these incidences to 8, because a right angle occurs on each side of a crossed line, does not double the number of the crossed lines but only counts the angles they thus make. So there are not 6 dimensions, but only and forever and everywhere, 3.

Definition in language may be pedantic, but definition in mathematics is simply accuracy. Mathematics without accuracy is worthless. So, I define a dimension with regard to its lingual root sources—dia, Greek for across, and Mensa, Coptic, Greek and Latin for measure (table by derivation from the use of tables as levels upon which to make measures)—with the result that a dimension is an across measure in any direction. Any, an infinite number of such lines may intercept a common point. But of those thus crossing that can be found to lie at right angles to one another, only 3 will be found. These are accepted as the 3 dimensions of length, breadth and thickness, or duration, width and height or depth. Their symbol from of old is the jackstraw. Formerly made of straw, but subconsciously of such racial importance, they are now cast of iron for children to play with and thus accustom themselves to the idea that no more than 3 sticks or straws can be the square-braced skeleton of a solid or of a vacancy imagined by abstraction from one's knowledge of solids.

If the smart Frank has any means of showing that his 16-cornered and 24-faced tesseract can be crossed by a fourth line not parallel to one of the 3-dimensional lines, let him flog his brains to it, and keep away from the lake while doing so, for water is a great inducement to the desperate.

In the meantime my personal animosity for lunatics spouting in public prints grows apace and I am sharpening my false teeth with files. Gr-rr-rr!—C. B. Loomis, Manhattan Beach, California.

Time Stands Still?

Dear Mr. Tremaine:

If you don't mind, I would like to insert my two cents into Science Discussions. Up to now I have been reluctant to write as I felt that I knew far too little to be able to contribute something of value. But, recently, certain curious aspects of the speed of light have been dancing around in my brain and I would like to unburden myself.

According to Einstein, the mass of a body increases with its speed until at the speed of light that mass, no matter how small originally, is infinite. Now it seems to me that this rule should apply to light itself which HAS mass (as is evidenced by the fact that a ray of light will bend in obedience to a strong gravitational field such as that of the sun). This mass should, at light's speed, be infinite. Consequently, the inertia of a beam of light should be infinite.

Now an object with an inertia amounting to infinity could not be affected by any conceivable force. If at rest, it could never be moved. And if already moving—as is the beam of light under question—it could neither be stopped nor turned from its path. Yet light can be stopped by a piece of tissue paper. How can you explain this paradox?

The effect on time of increasing speeds is also well known. Relativity states that as speed approaches that of light, time slows up until at 186,000 miles a second, time (so to speak) stands still. This seems to refute statements found in so many astronomy books (and science-fiction stories) that "even at the speed of light it would take four years to reach the nearest star."

No such thing! As time halts at the speed of light, a person traveling from Alpha Centauri to the Solar system, or vice versa, would not be aware of any lapse of time. Only to us poor earth-bound mortals would four years seem to have passed. In that sense the speed of light is infinite (as was thought in ancient times).

This, by the way, offers an entirely scientific (if impractical) means of travel into the future. Say that some one wants to see how the world would look a hundred years from now. His procedure would be as follows: getting into his space ship, he would proceed to a spot fifty light-years away at the speed of light. The journey would, for him, be practically instantaneous (due to the

curious behavior of time at the speed of light). But, fifty years would have elapsed on earth. He then makes the return trip at the same speed. Another fifty years elapse on earth and he lands a hundred years after his time.

With this system, however, it would be impossible to travel into the past, so I don't think it will ever be adopted.—Isaac Asimov, 174 Windsor Place, Brooklyn, New York.

P. S. I have an explanation for the problem I set forth in the first half of my letter, but I am keeping it to myself. I'd like to see what other readers make of it.

Not Separate Entities.

Dear Mr. Tremaine:

Why all this fuss about whether a body traveling faster than 186,000 miles per second would appear to be going backward? I have not read Einstein's theory, but a little common sense will expose the fallacy of the supposition. If the moving body and the light source were separate entities starting from a common source, it would not be a fallacy, but fact. However, look at the facts.

The speed of light from a body moving in space must be considered relative to some definite point, and the only observation point we can use is the earth. Since the body itself is the source of light, in the case of a body moving directly toward the earth at the rate of 200,000 miles per second, the speed at which its light would approach the earth is obviously 386,000 miles per second. If the body were moving directly away from the earth at the same speed, it would be invisible, since its light would be moving toward the earth at the rate of 200,000–186,000 or 14,000 m.p.s. But if the body were moving in a direction at right angles to a line joining its center with that of the earth, the velocity of its light would be 186,000 miles per second. The light speed for any other direction of the body may be obtained from the simple diagram and formula given here.



$V = 186{,}000 + 200{,}000 \cos \theta$

If this is not plain enough, consider the case of a train moving due east at the speed of 60 m.p.h. The surface of the earth is also moving due east at a speed of about 1,000 m.p.h., yet none will say that the train appears to be going backward. On the contrary, if an observer in space could see it, it would appear (disregarding the speed of the earth in its orbit) to be going 1,060 m.p.h.—William M. Danner, 6843 Thomas Blvd., Pittsburgh, Pennsylvania.

Answers for All.

Dear Editor:

Carrol Auvil spouts about efficiency. Granted a rocket is inefficient. But just show me any type of engine that is more efficient. As for melting points, that is just a problem that has to be solved, and will be solved by chemists. As for low exit speeds, I was under the impression that they were about as high as anything propelled by man, and they are making them higher as they go along. Granted that there is heat loss. The most efficient rocket will be when all the heat energy is converted into kinetic. But just show me one thing that has less loss.

The mechanical rocket is silly because you are combining the inefficiency of an internal combustion engine with the friction loss of a rotating wheel. The rocket is the most efficient motor we know of because the only moving parts are the molecules of the gases themselves, and gases have less friction than anything. The electronic rocket is good, and has been used often in stories under various names. The only trouble is the difficulty of getting a concentration of ions, electrons, or whatever you are using. Just think of the kick you would get out of a cathode ray projecting a solid ounce of electrons per second! But it's just not done. The cyclotron arrangement is good, but the magnet is so heavy! However, more research should be done along that line.

Elton Andrews: Why not use *minus infinity*, the log of zero, as the antonym of infinity? It is just as sensible as anything, because infinity is not a thing you can talk sensibly about. I can show without trouble that you can have as many infinities as you want, in fact an infinite number of infinities, but what does it mean?

Mark Reinsberg: Factories have been pouring millions of tons of carbon dioxide into the air for the past hundred years. Nobody has been able to detect the difference yet. How many trips to the moon at 5,000 tons a trip will it take to make a dent in five quadrillion tons of air (according to K. Raymond) that can be felt?

T. Dean Mundorf: A person on Jupiter could attain a speed in jumping equal to that on earth, because the equation connecting force with acceleration depends on mass and not on weight. But he couldn't get very far with it, because the acceleration of gravity would pull him down right away. He weighs four times as much *because* the gravity acceleration is four times as much; so he can jump ¼th as far, and not ⅛th, as you think.

Gerry A. Turner: The hydrometer vanished because the index of refraction of the glass was the same as the index of refraction of the liquid. As there was no refraction between them, light passed unobstructedly through the glass.—Milton A. Rothman, 2113 N. Franklin St., Philadelphia, Pennsylvania.

Why Not Low-speed Space Ship?

Dear Mr. Tremaine:

Several times in your magazine I have noticed the statement that in order for a space ship to leave the earth, it must attain a velocity of somewhere around 6 or 7 miles per second—if my memory serves me right.

Could some reader please tell me why it could not take off at a speed of say 2 miles per hour and continue at this rate until outside the influence of earth's gravity?—Earl Sharland, 73 N. Maple Ave., Ridgewood, New Jersey.

Arguments = Fourth Dimension?

Dear Mr. Tremaine:

Glenn Whalen of Illinois aroused my interest in his letter about light and the moving object. I have seen it before—Stewart's letter. But it's only now that I am interested enough to give my comments. He (Glenn) says that Russell Stewart contends that an object moving at a speed greater than that of light will have no light preceding it—assuming, of course, a source of light within the object. Such a state of motion is obviously impossible of physical attainment. Light being affected by gravity is matter in the free electronic state (i.e., electrons not bound into atoms). Any solid body reaching this limiting velocity of 186,300 m.p.s. would evidently suffer complete dissolution, reducing to free electrons even before this velocity were attained. Therefore, his problem is pure imagination. But—just for the sake of argument—IF it WERE possible, then the object would be totally invisible, not having any light preceding it to warn of its presence, providing, of course,

that the light would be turned on only after the object had exceeded the speed of light, in which case the light—if the object were transparent—would trail behind. I'm left open for any corrections, so come ahead any one.

About that fourth dimension, Donald: The reason we cannot imagine the existence of this dimension is because the fourth dimension is one step beyond our mere three dimensions, and so leads an existence of its own. Mind you, I'm not kicking, three is enough for me. The fourth is for arguments.—Frank Bochik, Jr., 721 East 39th Avenue, Gary, Indiana.

SCIENCEfiction?

Dear Sir:

The statement, "Our audience is interested in *the aquisition of scientific knowledge* as well as in the entertainment value emanating from things scientific," deserves a word of appreciation.

Those of us who have been reading science-fiction since before there was a magazine devoted solely to this absorbing form of literature feel this deeply. It seems hardly necessary to point out the not-so-very-odd fact that the favorite authors of science-fiction are also quite capable engineers and technicians.

I sincerely hope that this newly re-discoverd science-fiction will turn more young men into engineering or scientific careers than ever before.

With the sincerest expression of approval and satisfaction, I salute you.—William S. Sykora, 31-51 41st Street, Long Island City, New York.

What, Where, When, Why——?

Dear Editor:

The inspiration for this, my initial attempt at breaking into your forum, might never have been born had it not been for the letters of J. A. White, J. Buddhue and L. A. Croutch.

In discussing pro and con the subject of Mu and Atlantis, we must take into consideration three very important factors.

1. Time—the period in which the two lands were supposed to have existed. Was it geographically and geologically possible for the two lands to have existed at such a time?

2. Place—the establishment of a definite locality for each of the two lands. Was it possible for both lands to have existed in such areas geologically and geographically?

3. Proof—is the amount of acknowledged fact sufficient to justify the claims advanced?

Present-day science is not in possession of a single definite fact as to the period of time in which either of the two lands were supposed to exist. Proof of the above statement may be had from any of the leading historians, archæologists or men of science interested in the subject.

However, there are those who have advanced theories which cannot be wholly disregarded. The reason for this is obvious when we learn that scientifically minded people all the world over have, in their theories, advanced a time or approximate period for the existence of either or both lands. Although for the greater part many of these persons had never met or were even aware of the existence of the others, it is surprising how closely their various theories coincide.

Thus we work from the best average and allow a generous extension each way—2,400 B. C. —12,000 B. C. for Mu and 17,000 B. C.—4,000 B. C. for Atlantis.

We find that not only was the existence of both lands possible, but very highly probable—geographically and geologically.

Above all we must not disregard the astoundingly similar stories, myths and legends of such widely separated peoples as the Greeks, Egyptians, Mongolians and even the people of the far northern lands.

For in the history and mythology of the Norsemen, the Bretons, Greeks, Egyptians and —incredible, yet true—even the races which succeeded in power one to the other in the South Americas we find mention of one or both lands. Even though called by different names, they are located so similarly as to time and place by each of these races, that to disregard them would be folly.

Mr. S. DeCamp has my wholehearted admiration for his ability to tear apart a theoretical structure by expanding the weaker points until they are no longer able to bear contention. But Mr. DeCamp, suppose we have at hand a sufficiently plastic material to plug the holes which you so casually point out? I believe we do have such a material in the exhibits on display in the New York Museum and the Public Library. At any rate, the weak points you may find can be mended in a very logical manner.

Plato, you say—phooey. Why use Plato as an excuse for condemning the Atlan theory? If you care to investigate, you will find an Eskimo tribe (Eskimo, mind you) that is fast becoming extinct, yet still clings to the vague tale of a great land in which there was no ice or snow, no cold winds and no hardships. The name of the tribe is "Mu Kui," as closely as may be translated. They call the land of their story "Mwa Mu," which means in their dialect—according to Erik Norgressen—"mother of men."

It is very evident that in reading you did not attempt to confirm or deny any statements which the authors may have made. You merely read and took what was read for granted.

I feel sure that if you should compare point for point, fact for fact, theory for theory the books mentioned in your letter with as many others as you can obtain upon the same topics, you will finally sit back and wonder at the different conclusions and conjectures each author draws from the same set of facts.

In judging one way or another we must maintain an open and impartial outlook, seeing and believing only the facts on hand and theorizing accordingly. Most certainly we cannot read any definite author upon such controversial subjects and from his or her findings advance such and such a fact as true.

Therefore, is it not logical that among the readers there are those interested enough in the subject to choose, one at a time, some important point and through the medium of Science Discussions advance such theories as we may draw from the facts governing the point under discussion.

Then, perhaps we will get a new and salient point of interest either pro and con each month until, who knows, a satisfactory answer may be found.—Henry Boerum, Walton Lake, Monroe, New York.

If Atlantis Was——

Dear Editor:

I am not a learned physicist, naturalist or archæologist, but desire to submit the following theory regarding Atlantis.

Before the ice age, when the entire world was devastated by inestimable tons of glaciers from the polar regions, Europe and Asia were connected by a huge natural bridge that extended across the entire Atlantic Ocean. On this continent there flourished a highly civilized and greatly cultured race of people.

They lived in beautiful structures and the nobles lived in wonderful palaces. The scientists are said to have "harnessed" elementary electricity to a high degree of perfection. We are told that the rulers illuminated their colorful villas with powerful globelike objects, more crudely constructed, however, than our modern incandescent lamps.

Their language and literature were much more advanced and culminated higher than that of the Egyptians, Greeks or Romans. When the Egyptian race was not yet founded, the Atlanteans were flying about in heavier-than-air

machines very similar to our airplanes—though not quite as highly developed. They also had powered vehicles that could run about on the surface with greater speed than an automobile. Gold and silver were quite common among aristocrat and commoner alike. It was quite usual to see solid gold or silver statues of their gods and goddesses in public squares and parks. Truly, both were used mostly as building material. A coinage system was not predominant in Atlantis.

The later-age barter system prevailed. Livelihood was procured among the lower classes through work certificates. From this probably originated the money system throughout the later world. There undoubtedly was a tax imposed to support the central governmental system and the maintenance of an absolute ruler—a despot—almost inevitably.

Gunpowder was not developed yet on the "lost continent." Instead, some scientist invented and developed an air gun as powerful as some of our modern firearms. It was capable of hurling a steel dart to amazing distances.

The Atlanteans permitted no migration into their kingdom, nor did they permit exploration. They believed that immigrants would contaminate their highly developed culture. This is the basic explanation of why so little is known of her rise and downfall.

A limited period ago, a submarine volcano is said to have cracked the entire continent and shattered it into the sea. Some believed that a few escaped, and the remnants sailed in galleys as far as Egypt and found that ancient civilization. Others believed that they sailed farther west, and settled in the Guatemalan jungles and founded the Mayan civilization.—Edward Hickey, 75 Edgewater Place, Edgewater, New Jersey.

They Can't Both be Right——?

Dear Editor:

I have long been a silent reader of the magazine. I have always read Science Discussions with interest and have said nothing about some of the ideas and opinions expressed that I could have blown to pieces. But now I am writing because I have something to say that has been puzzling me for a long time.

Many of the people who voice ideas in Science Discussions base their ideas on theories of our prominent scientists, past and present. That is all well and good, but my question is why do we? They tell us that Keifer's star (recently discovered) has a gravity many times that of earth—something like 300,000 times as great. They tell us that the atoms of its matter, mind you, have no name so far as chemical elements are concerned, but are more intensely packed—thus giving them a greater density. They say it has an atmosphere only so many feet in depth, and that the gas or gases comprising it are so heavy that the amount that would fill a tennis ball would weigh some 100 tons here on earth. And yet, in spite of this information and masses of information about still other stellar systems, they continue to tell us that there are only 92 elements, and that that is all there are.

Now, anybody with any sense can see that somebody is off somewhere. The information compiled through spectroscopic analysis should give them the data necessary to classify those new matrials as chemical elements.

I would like to hear what other readers think about this.—Earl Rice, R. F. D. No. 2, Macksonville, Kansas.

Stories that Stick

Dear Editor:

I had stopped reading Astounding because I didn't like the type of stories published in it.

The other day I saw some Astounding magazines with Lovecraft's name on the cover so I grabbed them and read "At the Mountains of Madness" and "The Shadow Out Of Time." Why don't you print more stories like those? Boy, was I delighted!

Where is Flagg now? Doesn't he write any more? He wasn't as good a writer as Lovecraft, but he did have a knack of getting something into his yarns—something that stayed in your mind long after and made you want to read his stories again.

Maybe he got a little of that reality into his yarns H. G. Wells put in most of his stories—a sort of symbolism. But I liked that.

If you get stories like Lovecraft's, maybe I'll take to reading the magazine steady again. Here's hoping.—Jack Reynolds, 353 N. Fair Oaks Avenue, Pasadena, California.

Re: Articles

Dear Sir:

Don't take to heart my last letter about science articles. Articles or no articles, Astounding is still miles ahead of any other magazine.

Two recent stories I enjoyed greatly were Knight's "Frontier of the Unknown" and Schachner's "Past, Present and Future."

Great stuff!—T. Moulton, 11 Aylesbury Avenue, South Shore, Blackpool, Lancashire, England.

BRASS TACKS

Do you want this department restored? If so—write now!

Will You Read It Now?

Dear Editor:

Your magazine has come a long way and is now, no doubt, at its peak. However, I believe you are making one serious mistake—that is in acting as though every one of your readers has a wealth of scientific knowledge.

The fact that you believe this is partially evidenced in some of your recent thought-variant stories and in the increase in the number of science articles. However, I have no complaint to make about those. I *do* object to the supplanting of Brass Tacks by Science Discussions.

I will wager that a survey of your readers will show that a great majority are really not scientifically minded, but are merely in search of exciting and unusual literature. They accept the science in the stories without question. But they never read Science Discussions.

If you must have Science Discussions, make it much smaller and separate from your readers' department. Readers need a place to air their views and carry on their controversies, but they feel out of place in Science Discussions.

The same old readers are represented in this department each month. In the September number there is not a single comment on the stories. What has become of the regular letters

of Jack Darrow, Forrest Ackerman and others like them?

Your magazine depends on its readers. Those readers like to contribute to that magazine. No doubt you still urge readers to write about the magazine, but the stimulus of the possibility of its appearing in print is gone.

A properly conducted readers' department can furnish delightful reading. There can be arguments and verbal combats over other things than cold scientific facts. There can be humorous letters as well as serious letters of constructive criticism. Only with such a department can you really know the readers' preferences. Did you take a poll of your readers before changing to Science Discussions? I heard nothing of it and I have read every issue since the beginning.

However, I no longer read your letter department. Neither, I think, do many others. Perhaps, they will quit reading the stories next!

I am a sincere friend of Astounding and wish it only success. That is why I make these suggestions.

As to recent stories, Smith's "Galactic Patrol" starts out splendidly and should rank high among E. E.'s great novels.

Schachner is kept too busy these days and seems to have a tendency to cut off a two-or-three part novel and make it a novelette. Witness, "Past, Present and Future." A good story, though.

"Released Entropy" was good, though much like the same author's "Galactic Circle." Let's hear again from Campbell, Taine, Carr, Jones, and others who used to write.—Donald W. Allgeier, 643 S. Robberson, Springfield, Missouri.

October Takes the Cake.

Dear Editor:

Yes, I'm back again and am prepared to pass official judgment upon Astounding. This time you needn't hide under the desk for I bring you good tidings. If you remember my last cheer for the cover, just recall it, as it will serve for the September and October issues. Astounding's snapped out of the way it started the year. From facts and your editorials, the fifth year of Astounding is going to raise scientification back to its former heights.

I'll skip comments on the last few issues of your magazine and just tell you that since July, 1937, each issue has been better and better—the apex of the climb represented in the October Astounding. "Out of Night" by Don A. Stuart is, in my mind, a revival of the far-famed "good old days," and was by far the best story of this issue, or maybe even the entire year. "Galactic Patrol" is all we expected it to be, and I'll gladly buy Astounding just for that. "Mr. Ellerbee Transplanted" was an enjoyable farce, or whatever you might call it, of the future. It gets my hearty approval. "The Rule of the Bee" was a very good short. It gets my approval. "A Menace in Miniature" was a fitting sequel to "The Scarab." This issue takes the cake, and I sign off.—T. Bruce Yerke, 660 N. Mariposa Ave., Los Angeles, California.

A "Brickbatier" Says a Charge.

Dear Mr. Tremaine:

With the replacement of Brass Tacks by Science Discussions, I feel more and more with each issue a vast emptiness in the back of Astounding. No longer may the silent reader see how the general public liked the story which he has been dreaming about. No longer may he give vent to his joy or sorrow at the preceding issue. Instead, he sees a bunch of ruffians, cutting each other's throats with theories.

I think it was a grave mistake, this cutting out of the criticisms which are so necessary for the improvement of any magazine. Not only are criticisms necessary for improvement, but to promote a friendly feeling between editor, author and reader. I don't think the author minds applause and he can use constructive criticisms.

The last decent shower of brickbats were in the May issue. Since then, well, look for yourself.

As for room—shove over Science Discussions. Limit letter space, of course with exceptions. Not that I don't like Science Discussions; I do and readily participate in its discussions. But there are things which are more important. We "brickbatiers" deserve a few pages at least.

How about it, "scientifictionates?" Get some of that spirit of 1936 into this magazine! All in favor flood this column with ayes!—Mark Reinsberg, 430 Surf St., Chicago, Illinois.

Considers Science in Error.

Dear Editor:

I am one of those peculiar persons known as "fault finders." And if I come across any facts, stated in a story that don't quite meet with my approval, I look them up.

For instance, in your October, 1937, issue in "Penal World," the temperature is stated as −120° C.; and there is supposed to be liquid ammonia and solid oxygen present. Very interesting!

But after looking in the 21st edition of the "Handbook of Chemistry and Physics" (which I suggest some of the authors do more often) I find that NH melts at −77.7° C. and that O_2 melts at −218.4° C. Therefore to be correct, Jupiter should have solid ammonia and perhaps liquid oxygen.

In the article "Sleet Storm" a certain meteor is said to have the temperature of 50,000° C. It is stated that tungsten boils vigorously (N. T. P. I suppose) at 1/10th of that temperature, or 5000° C. However, according to my findings, tungsten boils at 5900° C. Pretty close, but not close enough.

Otherwise, the stories are very good. Every one makes mistakes, I guess.—Lester J. Rose, 1111 West Masonic St., Gainesville, Florida.

Articles Fine; Smith Ditto.

Dear Mr. Tremaine:

Let me congratulate you on the presentation of two very fine articles in recent issues of your and my magazine, namely "Super Fast Eyes" and "Ra, the Inscrutable." These articles alone were worth the price for the whole book. Such articles are what we want—write-ups on present day scientific advancement and discoveries that show what is fiction yesterday is fact today. I hope we will receive more like them.

I have no fault whatsoever to find with the two recent issues of the magazine. They are fine and you are doing a splendid task of climbing the ladder of super science-fiction.

Nat Schachner didn't appear in the October issue. Can it be that what I said about him becoming a mass producer has gone to his heart? I'm not conceited but if, in my feeble way, I have been responsible for something really better from him soon, that is reward enough.

Smith's story starts out fine. It beats his "Triplanetary" all hollow. But it still isn't as good as his Skylark yarns. Of course, I was introduced to him via them, and first impressions usually remain the longest. Smith is a fine example of a writer who doesn't turn out copy like a sausage machine turns out sausages, and thus becomes boring. Instead he takes two or three years to write a yarn, and then—— That blank contains a word of praise that hasn't been invented yet! In other words, I couldn't think up a term to express my feelings!—Leslie A. Croutch, Waubeek St., Parry Sound, Ontario, Canada.

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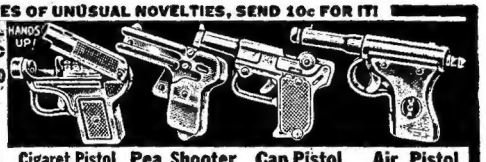


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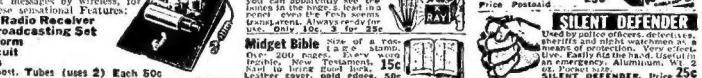


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25c

35c

Cigarette Stinkers

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Standard contest endurance model. Flies continuously for 3 to 5 minutes. Has 24" wingspan. Easy to build from accurate kit. 15" wingspan. Price Only 25c

Ocarino

Popular "sweet potato." Easier to play than a harmonica. Clear, sweet tone. Use with piano, guitar or orchestras! Small ..... 35c. Large ..... 50c. Medium Size (A) 45c. 4 inch size, 15c.

Jew's Harp

Ever popular, easy playing Jew's Harp. Excellent tone. Adjustable for radio broadcasting. Learn to play in three minutes. Medium SIZE 10c. 4 inch size, 15c.

Nose Flute

Beautiful clear, rich tone. Imitate almost any instrument. Very popular players with orchestras. Easy to learn and play. Medium size ..... 10c. Large size 15c

Hill Billy Band

5 Piece Hill Billy Band. Get the gang and have lots of fun. Includes Jew's harp, harmonica, flute, warbler and nose flute. Imitates sax, bugle, piccolo, etc. Complete 10c

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Large size, nicely printed cards, well suitable for framing. Hang one in front of friend and he will be tortured to excess! Many choices: Marriage Certificate, Liar & Grafter Certificate, Certificate Snobish Athletes Certificate, Gold Diggers Certificate. Price 10c each license. Any 3 for 25c.

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RO-LO LASSO! Performs rope tricks without practice. Write for Rings, Corkscrews, Curls, Skipping Rope, etc. Only 12c. Hours of fun. Only 12c

Rolmonica Automatic Mouth Organ

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Extra Rolls 15c

Automatic harmonica tune that plays by itself. Just like a player piano. Made of brass band all the way. Produces a concert sensation in tone. Has been in use for years. Just insert a roll and turn the handle and you're done. Nothing could be simpler. Hundreds of rolls. **My Blue Heaven,** Sidewalks of Cuba, **Sweet Adeline,** Over the Waves, **My Wild Irish Rose, Merry Widow Waltz, Tea for Two, Dardanella, Yes Sir, That's My Baby, Alexander's Rag Time Band,** Minnie from Trinidad, **Yankee Doodle, Old Folks at Home, Hot Time in the Old Town Tonight, Waltz Me Around Again Willie, Hail Hail the Gang's All Here, Honey, I Saw Stars** rolls. 25c. ROLMONICA with 1 roll $1.10

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PRICE 25c

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310 Illustrations

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Ready for duty on a minute's notice. Keeps trousers under the steady heat action. Gives a perfect crease. No moisture necessary. Nothing to burn. Rest in cloth bag when not in use. Handy electric presser will last for years. Constructed with black enamel finish, complete with 6 ft. cord. Operates on A.C.-D.C. 110 or 220 volts. Price $1.95

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LUMINOUS PAINT



LUMINOUS PAINT, when applied to any object, emits rays of white light, rendering it visible in the dark. The darker the room, the more brilliant the glow. Simple to use—you can do it! Apply some to the picture and it will glow in the dark. Paint pushbuttons, switches, anything, everything with it. Small bottle 25c. Medium size 50c. Large size $1.00 postpaid.

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Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, police man or parents.

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OVER 101 ILLUSTRATIONS



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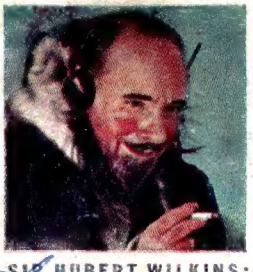


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